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XXIII.

STUDIES REGARDING ANAPHYLACTIC REACTIONS
OCCURRING IN HORSE ASTHMA AND
ALLIED CONDITIONS.*

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The object of the following paper is to review briefly our knowledge of anaphylactic shock occurring after the administration of antitoxic sera, and to describe some studies which may prove of value in affording indication of the existence of this danger.

The subject of anaphylaxis occupies now a relatively large place in literature, but no general agreement has yet been reached in regard to much of its phenomena. For our present purpose, however, it may be useful to quote the following definition of protein sensitization as formulated by V. C. Vaughan:

"(1.) Sensitization consists in developing in the animal a

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specific proteolytic ferment which acts upon the protein that brings it into existence and on no other.

"(2.) This specific proteolytic ferment stored up in the cells of the animal as a result of the first treatment with the protein remains as a zymogen until activated by a second injection of the same protein.

"(3.) Our conception of the development of a specific zymogen supposes a rearrangement of the atomic groups of the protein molecules of certain cells in the animal body or an alteration of the molecular structure. In other words, we regard the production of the specific zymogen not as the formation of a new body, but as resulting from an operation in the atomic arrangement within the protein molecule and a consequent change in its chemism.

"(4.) Some proteins in developing the specific zymogen produce profound and lasting changes in molecular structure, while the alterations induced by others are slighter and of temporary duration, the molecular structure soon returning to its original condition.

"(5.) Bacteria and protozoa are living, labile proteins, while egg white, casein, serum albumin, etc., are stable proteins. The proteins of the one group are in an active and those of the other in a resting state, but both are essentially proteins, made up of an acid or poisonous chemical nucleus and a basic or nonpoisonous group. The former in its effects upon animals is the same, whether derived from the living or the dead protein, and the latter in the one instance induces specific immunity, and in the other specific susceptibility; but the immunity and susceptibility each consists in developing in the animal body the capability of splitting up a specific protein. If the living protein be split up before it has time to multiply sufficiently to furnish a fatal quantity of the poison, the animal lives, and we say that it has been immunized. If the stabile protein be introduced into the animal, it leads to the development of a specific proteolytic ferment, and if enough of it to supply a fatal dose be reinjected after this function has been developed, the animal dies. The first or sensitizing dose of egg white injected into an animal is digested just as surely as is the second, but the process goes on so slowly that we see no effect; but in fact the first dose has affected the animal profoundly—so profoundly that the change wrought

in certain cells of the animal body persists for months, possibly for years, and may be transmitted from the mother to her offspring. We do not say that the animal is sensitized unless some immediate and striking effect follows our treatment, but this is wrong. An immediate effect, especially a fatal issue, on reinjection, depends upon the rapidity with which the protein is split up and its poisonous constituent set free. The sensitizing injection leads to the development of a specific enzyme, and the protein of this injection is so slowly digested that the poison set free at any one time is not sufficient to produce any recognizable effect. If time enough be allowed between the sensitizing and the reinjection for the accumulation of a large amount of the specific enzyme, then the protein is split up promptly and anaphylactic shock and death result."

In the administration of diphtheria antitoxin about one-third of the number of individuals who received injections for the first time, the so-called "serum fever" is observed in the course of six to twelve days, consisting of edema and a rash resembling urticaria. Von Pirquet explains this phenomenon on the hypothesis that some of the unchanged serum remains in the body until sensitization is sufficiently developed to bring the effects of the toxin body up to the level of clinical observation.

"This demonstrates that a reinjection is not necessary in order to develop the state of protein sensitization. The evolution of the specific enzyme begins soon after the introduction of the foreign protein and gradually proceeds, and the liberation of the protein poison increases *pari passu*. It is not until the effects of the liberated poison approach the 'level of clinical observation' that we recognize them, but this is not at the beginning of the process. Sensitization of the body cell probably begins as soon as the foreign protein comes in contact with it. The foreign protein so impresses the body cell that the latter undergoes such changes in its intramolecular structure that it elaborates a new and specific enzyme. The fact that soluble proteins sensitize so much more promptly and efficiently than suspensions, renders it probable that cellular penetration is essential to the most thorough effect. The additional fact that relatively dilute solutions sensitize more

promptly and more efficiently than more concentrated ones, suggests that degree of molecular concentration has some influence upon the processes of sensitization."

Von Pirquet and Schick observed that in individuals who received reinjections after intervals of twelve days or longer, a certain number presented a reaction similar to "serum fever," while occurring several days earlier. In other individuals the reaction appeared within a few hours, often within a few minutes, after the reinjection. Those individuals are fully sensitized, and it is in these that anaphylactic shock should be feared.

The duration of sensitization is apparently unlimited. Darling reports two cases of anaphylactic serum disease occurring over six years after primary injection of horse serum; Thaon a case following after four years on a reinjection of tetanus antitoxin. Gillette reports a case of an asthmatic, fifty-two years of age, in which death followed in five minutes after the injection of diphtheria antitoxin. In many articles on the subject the statement is made that asthmatics are liable to anaphylactic shock after the injection of horse serum, but no attempts, so far as I am aware, have been made to define with precision the types of asthma which are susceptible. Dr. Valentine of Lexington, Massachusetts, has kindly allowed me to refer to a case occurring in his practice four years ago, in which a boy, sixteen years of age, a sufferer from asthma, was given an injection of diphtheria antitoxin followed by death in the course of a few hours. The patient had never received a previous dose of antitoxin.

In regard to the prevention of anaphylactic shock and its treatment, the following suggestions have been made:

Wiedemann states that in sensitive cases another variety of serum should be employed, and reports a case where ox serum was given successfully to a patient who had shown intolerance to horse serum. This serum is prepared by the Hoechst Farbwerke, but is not, so far as I know, procurable in this country. Besredka states that the heating of serum to 56° C. tends to suppress the phenomena of sensitization, and that all the antitoxin prepared at the Pasteur Institute is subjected to this temperature. Anaphylactic shock is said to be less frequent and severe in France than in other countries. The in-

ternal administration of serum in intolerant cases has been suggested by Asam, but this might destroy the efficacy of the antitoxic principle from digestion, and furthermore a delayed anaphylaxis might occur, as seems to have been the case in an instance reported by Wiedemann. If shock has occurred the hypodermic administration of atropin has been suggested. In one instance of dangerous symptoms arising from sensitization by thyroid extract (O'Brien), venesection was employed with prompt relief. Ether is also recommended for the purpose of diminishing spasm of the arterioles. In cases of diphtheria where it is absolutely necessary to control the disease, one may be justified in following the recommendations of Rosenau and Anderson, of administering a minute dose of antitoxin for the purpose of exhausting the zymogen in the system, and then following this, after the anaphylactic symptoms have disappeared, by a full dose of antitoxin. A case reported by Wiedemann, however, shows that even so small an amount as this, when administered subcutaneously, may be attended with danger. A patient three years of age, who two years previously had received 30 cc. of diphtheria antitoxin, was injected with one drop. This was followed by severe dyspnea and cyanosis, although the patient recovered.

In addition to such conditions of sensitization to horse serum, other conspicuous examples occur, such as the intolerance to various pollens found in hay fever, and the reactions following the injection of certain foods, such as eggs, strawberries, fish and various nuts.

Although the statement is repeatedly found in the literature that asthmatic individuals may show anaphylactic shock after the administration of antitoxic sera, no systematic observations have been made in regard to determining actually when danger may be anticipated. Such an investigation could not justifiably be carried out by the subcutaneous injection of horse serum, since in the first place alarming symptoms might be occasioned if an excessive dose were administered, and in the second place it is possible that certain individuals might receive the test dose without unusual symptoms, but might thereby be sensitized so that later if diphtheria actually occurred the injection of antitoxin might be followed by anaphylactic shock.

The Von Pirquet test for tuberculosis gave rise to the suggestion that a similar skin reaction might be found in individuals sensitive to horse serum, and a number of patients were consequently examined in this manner. On theoretic grounds those individuals who showed vasomotor symptoms in the neighborhood of horses would be most likely to show a reaction, and consequently all those of this class of whom I had records were asked to report for the test. Also a number who had a history of vasomotor symptoms of other types were examined.

The tests were made in the following manner:

1. The lobe of one ear or the skin of the arm was moistened with a drop of diphtheria antitoxin prepared by the Massachusetts State Board of Health, and a superficial cut was made with a paracentesis needle.
2. A drop of the same antitoxin was placed in one nostril, upon the anterior end of the lower turbinate.

REPORT OF OBSERVATIONS.

Twenty-seven cases were examined by one or both of the above methods. These may be grouped as follows:

1. Cases in which horses had been known to excite nasal vasomotor symptoms or an asthmatic attack.
2. Cases showing no reaction to horses, but in whom the asthma was apparently associated with bronchitis alone, or occurred only during the summer in connection with hay fever.

Eleven cases with a history of sensitiveness to horses were examined with the following results:

Case 1.—Miss W., twenty-eight years old. For eight years asthma more or less constant throughout year, increased markedly by the neighborhood of horses. Has been under observation for six years. A large cystic right middle turbinate was removed in 1909 without influence on asthma. Tonsils were removed for septic detritus four years ago. During past two years asthma has been much less troublesome, and she is able to drive behind horses, although the air of stable excites an attack.

A drop of diphtheria antitoxin was placed in each nostril. Within five minutes the mucous membrane of both lower tur-

binates and of the septum became pale, edematous and covered with serous fluid. The clinical picture was that of typical hay fever, and the symptoms passed off in the course of two hours. A week later a scratch was made in the skin of the lobe of one ear, and the same antitoxin applied. In three minutes the patient stated that the ear itched, and examination showed a white, slightly raised area of the skin immediately surrounding the scratch, while the skin beyond this white area showed reddening and general swelling, the lobe of the ear as a whole being about twice the thickness of the other. Five minutes later the white wheals had disappeared, and the surface of the skin was diffusely reddened. In the course of the next hour the edema of the lobe began to diminish and two hours later had disappeared.

In order to determine whether the skin reaction was due to the trauma itself or to the serum, a few days later a similar cut was made in the lobe of the other ear, but no serum was applied. No change whatever was noted in the surrounding skin. Egg albumen was applied next with negative result. The watery extract of June grass was also tested, both on the skin and in the nose, with negative result.

The tests with the horse serum were repeated, always with the same result. It was found that if diluted the serum gave a less marked reaction, which also came on several minutes later. A ten per cent dilution with water was sufficient to cause a retardation of several minutes, and while the skin showed diffuse reddening and swelling, the white wheal bordering the cut did not appear. A one per cent dilution still showed local reaction, but proportionately less intense.

In view of the experiments of Rosenau and Anderson, who found that sensitized animals may be rendered refractory if they receive daily minute doses of serum subcutaneously for ten or more days, it was determined to immunize the patient if possible to horse serum. While it would have been desirable to administer the serum hypodermically in order to effect its parenteral digestion, yet this was not easy, owing to the fact that the patient lived at a distance and also demurred at the suggestion of hypodermic administration. A ten per cent solution was therefore given the patient to use in an atomizer, to spray into the throat three times a day a few minutes before

meals, in the hope that some absorption of the serum might occur through the mucous membrane of the fauces and through the walls of the empty stomach without alteration by gastric digestion. During the night following the first day of this administration the patient experienced considerable asthmatic disturbance, but on the following day and for the next two days persisted faithfully with the spraying, although the difficulty in breathing became almost constant. When I saw her on the fourth day the respiration was labored and the chest full of whistling rales. The spraying was then stopped and within twenty-four hours the asthma ceased. After a week of freedom from asthma spraying was resumed, with a one-tenth of one per cent solution of serum. No asthma occurred, and the strength of the serum was then gradually increased. In four weeks a ten per cent solution was used without exciting asthma. At this time a skin test with a ten per cent solution gave negative results, but the pure serum gave a reaction about equal in intensity to that caused originally by the one per cent solution.

During this period the reaction of the patient to the neighborhood of horses was noted. Making due allowance for the possibility of suggestion, a distinct improvement in tolerance seemed evident. At the present time she can unsaddle her horse after a ride without exciting further vasomotor symptoms than sneezing several times, although such proximity would previously have excited severe asthmatic breathing.

Case 2.—Mrs. B., thirty years old. For ten years the neighborhood of horses has produced sneezing, more severely of late, and accompanied by a sense of constriction in the chest. The general health is otherwise good. Horse serum applied to a scratch on the skin produced in six minutes considerable reddening and edema without the marginal white line of the preceding case. In the nose the serum gave no result. On the following morning the skin test was repeated with the same serum, without exciting any local reaction whatever. This is difficult to explain except on the hypothesis that the first reaction exhausted sufficiently the amount of zymogen in the system. What the dose of serum should be to accomplish this result is doubtful, but the amount which could enter

the system through a scratch certainly must be extremely small.

Case 3.—Mr. F., forty-seven years old. For many years severe asthma excited by horses. Deviation of the septum and chronic ethmoiditis on the left side. Horse serum applied to a cut of the skin produced in five minutes a marked reaction similar to that of Case 1. A moderate amount of edema and watery discharge was occasioned by the nasal test.

Case 4.—Dr. B., forty years old. Until five years ago nasal vasomotor disturbances and asthma excited by the vicinity of horses. On several occasions when hunting deer or moose, asthma has been caused by handling the dead animals. Without treatment or known reason this tendency has of late years gradually diminished, and horses now cause no discomfort. Tests with the serum in the nose and on the skin caused no reaction.

Case 5.—Mrs. V. Seen first in 1906 for asthma of many years' duration. Had had much treatment of nose without effect. In intervals of attacks chest examination was negative. Has had one or two small dogs continually about her. For several years following the first examination it was observed that on being away from the dogs she was free from asthma, and an attempt was made to have her dispose of the animals, but without success. In November five years ago she was given pollantin by her family physician for an attack of sneezing and moderate asthma. This was immediately followed by exceedingly severe dyspnea, nasal obstruction, profuse watery flow from the nose, being the worst attack that she had ever experienced. The symptoms subsided in the course of twelve hours. Two years ago both dogs were disposed of on account of old age, and the patient has since then had no dogs in the house. During this period she has been entirely free from asthma, although a sense of constriction in the chest is experienced when in the neighborhood of horses. When I explained the test which I wished to make, the patient was unwilling to have the antitoxin applied to the nose, as her recollection of the asthma following pollantin was so disagreeable, but consented to have the test made in the ear. Within two minutes after the application of antitoxin to the scratch on the lobe of the ear, a clearly defined, elevated, white

area appeared, bordering the scratch, surrounded by a diffuse reddening, the whole lobe becoming symmetrically swollen, this resembling perfectly the appearance on the skin which would be produced by a nettle. Five minutes later the white area became changed to red, as in Case 1, and the local manifestations cleared up slowly in two hours.

Case 6.—Miss J., twenty-four years old. Seen in 1909 for recurrent colds and asthmatic attacks since three years of age, always excited by horses, although also occurring at all times in the year, often without assignable cause. Bilateral ethmoiditis existed, characterized by enlargement of middle turbinates, and polypoid degeneration of the mucous membrane. In 1910 the ethmoid cells were curetted, and the patient experienced relief for a period of ten months, when slight shortness of breath developed. One year later, in November, asthma appeared following a cold, and a return of polypoid tissue was observed in the right ethmoid region. This was curetted with relief from the asthma. In March of this year the patient was tested by the methods above described, with positive result, one drop of the antitoxin in the right nostril causing a typical vasomotor swelling and pallor of the mucous membrane, completely obstructing respiration on that side, and attended by profuse watery discharge, the other side remaining unaffected. The right eye became suffused with free lacrimation. The skin test of the ear developed in four minutes as a clearly defined anemic area of one-fourth inch in width bordering the incision, and contrasting sharply with the hyperemic neighborhood. The whiteness of this area was especially well defined against the generally reddened lobe, fading in four minutes, leaving a generally reddened edematous lobe which returned to normal in three hours.

Case 7.—G. T., male, twenty-four years old. Seen in February of this year for acute ethmoiditis which cleared up after ten days. There was an old right chronic ethmoiditis with polyp formation. Polypi had been removed in the past on several occasions. The patient stated that during the summer the neighborhood of horses would occasion sneezing and what he described as asthmatic feelings. This condition was apparently not sufficient to cause much discomfort. The serum test in the nose gave a delayed reaction, occurring in

about half an hour, and lasting for two hours later. The serum test on the skin gave negative results.

Case 8.—Miss G., twenty-four years old. Seen last summer for nasal obstruction and hay fever, aggravated in the neighborhood of horses. During the following winter she was seen on three occasions for nasopharyngeal catarrh, and stated that she was at this season able to go near horses without symptoms. A serum test of the nose gave no reaction.

Case 9.—Miss C. Seen in May, 1913, for perennial vasomotor rhinitis, increased by the neighborhood of horses in summer. No asthma. During the winter is able to come near horses without symptoms. The serum test in the nose gave negative results. The skin test was not applied.

Case 10.—J., male, twenty-three years old, brother of Case 6. In general well. Sneezed since boyhood whenever in the neighborhood of horses. No asthmatic symptoms. Submucous resection had been done by another physician one year ago. Except for small septal perforation, nose essentially negative. Introduction of antitoxin into nostril not followed by reaction. Skin test on ear negative.

Case 11.—E., male, sixty years old. Hay fever many years. Horses excite sneezing and watery nasal discharge, but no asthmatic symptoms. Chronic nonsuppurative ethmoiditis and polypi. The serum tests of the nose and skin were negative.

Six cases of bronchial asthma which gave no history of irritation from horses were examined by the nasal and skin tests with negative results. Five cases of single uncomplicated hay fever received the serum in the nose and on a cut of the skin without exciting reaction.

SUMMARY OF CASES.

In five patients with horse asthma the application of horse serum to an abrasion of the skin produced within a few minutes sharply localized edema and reddening. In three of these cases the introduction of horse serum in the nose caused edema of the nasal mucous membrane, together with profuse watery discharge and sneezing.

One case of horse fever without asthma gave a delayed reaction to the nasal test (although this was reported and I cannot vouch for it), but was negative for the skin test. A

similar case gave a delayed but definite reaction to the skin test, but showed no nasal symptoms. Four of the horse fever cases without asthma were negative for both tests. It is worth noting that in Cases 6 and 10, while the sister, who had horse asthma, reacted markedly to both tests, the brother, whose vasomotor symptoms from horses affected the nose alone, showed no reaction.

Six cases of bronchial asthma and five cases of hay fever were negative for both tests.

Three cases without vasomotor symptoms which had received immunizing doses of antitoxin several months previously showed no reaction to the tests.

The results of these experiments indicate that a localized anaphylactic reaction from horse serum may be occasioned in certain individuals who experience asthmatic disturbances from the neighborhood of horses. The severity of these vasomotor symptoms appears to be a determining factor in the production of the reaction, since patients with nasal symptoms alone do not appear to be sufficiently sensitized to horses to give an immediate positive skin test.

The number of cases thus far tested is too small to justify definite conclusions in regard to the value of these tests in detecting the existence of a state of sensitization to horse serum, but if further studies should confirm them, they should prove to be of assistance to the physician who is in doubt whether in a given case it is safe to administer antitoxin. It is, therefore, suggested that a preliminary skin test with horse serum be made in all patients who have previously received an injection of antitoxin derived from horses, whether tetanus, diphtheria, or plague serum. Furthermore, in all patients who are about to receive antitoxin for the first time, inquiry should be made as to whether they have ever been disturbed by asthmatic symptoms when in the neighborhood of horses, and if so they should first be tested.

So far as these experiments go, they would indicate that in horse asthma a dangerous anaphylactic shock may occur after the hypodermic administration of horse serum. In horse fever with nasal symptoms alone, this danger is less or not at all to be feared, and in other types of asthma and of vasomotor rhinitis it is not present.

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XXIV.

INTRANASAL OPERATION FOR THE RELIEF OF NASOLACRIMAL STENOSIS.*

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The purpose of this paper is to report a procedure for the relief of stenosis of the nasolacrimal duct. There is not sufficient time to allow a review of the literature, and it is not necessary to go extensively into the pathology and the resulting symptomatology of this condition. Every ophthalmologist knows how annoying a partial stenosis of the nasolacrimal duct is, and what a serious condition may follow an absolute blocking of this tube. There is not only the annoyance of the overflowing tears down the cheek, but there is almost always, sooner or later, a more or less serious dermatitis of the whole area, which is constantly soaked.

Under normal conditions the nasolacrimal duct is a tube about 20 mm. in length and about 4 mm. in diameter. It connects the lacrimal sac above with the anterior portion of the inferior meatus of the nose below. The upper portion of the duct is enclosed in a bony canal made up of the lacrimal bone and the nasal process of the superior maxillary bone. Between the lumen of the duct and the anterior portion of the middle meatus of the nose there is the nasal mucous membrane, the underlying periosteum, the bone, and the mucous membrane of the duct. The bone at this point is usually very thin, about the thickness of paper. The lower portion of the duct lies for a greater or less distance under the mucous membrane of the anterior portion of the outer wall of the inferior meatus. This portion of the duct is more or less collapsible and

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forms the so-called Hasner valve. Whether this is, or acts, as a valve is not important at present. It is a fact that through infection of the nose there is frequently extension of the inflammatory processes into the nasal end of the duct, and that occasionally there results partial or complete obliteration of the duct. Slight stenosis may produce no symptoms. More blocking may give symptoms only when for any reason there is a greater overflow of tears. Only the marked cases which produce constant and distressing symptoms, and which are not relieved by the passing of sounds, come into the class which we are now considering. Although these extreme cases are not common, they are not extremely rare, and any procedure which can give relief is worthy of our consideration. The natural nasal opening of the lacrimal duct is well situated to care for the inflow of the lacrimal secretion, and under the usual normal conditions the individual is not aware of the existence of this secretion. Even when for any reason there is an increased flow, it is not noticed within the nose until the flow becomes excessive.

When we make an artificial terminal in the middle meatus the secretion runs forward and downward over the anterior end of the lower turbinate, and an amount which would give no sign of its existence in the lower fossa shows itself and necessitates the use of a handkerchief. Under ordinary conditions with a normal lacrimal flow the secretion is absorbed into the inspired air and there are no signs of its existence. When the flow becomes too profuse for normal absorption into the air there is the condition which is seen in the normal case, only it is noticed sooner and it is more pronounced. In whatever manner we drain the lacrimal sac into the nose, I am of the opinion that we shall find that the secretion will not be as easily and as well cared for as when it is drained into the inferior meatus in the normal condition. However, the condition resulting from a stenosed duct is so disagreeable and constant that the slight and transitory inconvenience caused by the secretion at the tip of the nose is a comparatively trivial matter. If we can establish drainage to care for the overflow from the eye, it is infinitely better than to remove the reservoir which is constantly washing

and is ever ready to flush the conjunctival sac whenever there arises a need for such cleansing. I think that all will agree that it is far better to reestablish an outlet for the excessive flow of tears than it is to remove the lacrimal gland, and with it its physiologic protection of the eye.

Twelve years ago, in June, I operated upon my first case for complete obstruction of the nasolacrimal duct. A probe could not be passed into the last third of an inch of the duct. The patient's condition was one of constant suffering, as the whole left cheek was in a severe state of inflammation with areas of excoriation. At this time I passed a small eye probe as far into the duct as possible, and then estimated its distal position. The anterior portion of the middle nasal fossa was thoroughly cocaineized and a vertical cut was made through the mucous membrane. This was elevated both forward and backward, and then with a curette the bony covering of the duct was removed with the outer mucous membrane. The probe was now easily passed through the artificial opening into the middle fossa of the nose. A piece of silver wire about eighteen gauge and about one and one-fourth inches long was passed through the nasal opening into the duct upwards as the probe was withdrawn from above. A disc of gutta percha was attached to the nasal end of the silver wire, and so shaped as to give support to and maintain the whole in the desired position. The wire was worn for about three weeks, when there was apparently perfect healing. After removal of the wire the lacrimal secretion discharged through the artificial opening, and continued to do so for four years, since which time I have neither seen nor heard from the patient.

In January, 1903, I operated upon a man who had had symptoms of nasolacrimal duct stenosis for eight years. He had received an injury to the nose just previous to the beginning of his lacrimal trouble. As in the first case, the finest eye probe could not be passed through the distal end of the duct. The results of the first case were so satisfactory that it seemed advisable to try a similar procedure in this case. The anterior end of the lower turbinate was cicatricial and apparently closer to the outer wall of the fossa than usual. A similar operation was carried out as

in the first case, and the same treatment was applied. There was marked relief for about three weeks after removal of the silver wire, when there began to be signs of impatency. It was with difficulty that the smallest eye probe could be passed through the duct. Effort was made for several weeks to dilate the stricture of our artificial opening, but with no permanent results; after all efforts the case was a failure.

In September of the same year a woman was referred by the patient who had been cured by operation. She had apparent blocking of the right lacrimal duct, with the usual disagreeable symptoms. She had been probed off and on for several years without apparent improvement, and at time of examination showed a low grade purulent dacryocystitis. A small eye probe was passed through the duct with considerable difficulty. The sac was douched and treated with hydrogen peroxid, in hopes of cleaning the purulent condition before attempting operative interference. After three weeks' treatment there was still some purulent fluid always found within the sac, and it was thought best to try and establish good nasal discharge. The patient was anxious, as she had seen the results in the case of her friend. The operation was carried out in all respects as in the first two, and the after-treatment was the same except there was added douching of boracic acid solution into the lacrimal sac and duct. For about five weeks after the operation the results were very gratifying, there was no overflow of tears, and the condition of the sac was nearly if not entirely well. At about this time there began to be some setting back of the secretion. The duct was dilated by probes every second day for several weeks, but without avail. Another operation was carried out to try and establish an outlet as high as possible within the nose. The results of this effort were satisfactory for six weeks, when the cicatrices again closed the duct. These two failures following only one success put a damper upon the first success, and another case was not attempted until March, 1907. This case was in most respects similar to the second and third, and therefore its review is not essential. After these experiences I gave the subject little

thought until in June, 1911, when a very marked case sought relief from these disagreeable conditions.

This patient was twenty years old, and her life and prospects were wrecked by the constant overflow of tears and the resulting lesion of the skin upon the cheek. In studying the case and reviewing the preceding failures, it seemed that if some method could be devised to prevent extensive granulation with the resulting cicatrices, the unfavorable results could be reduced if not entirely obliterated. By the methods described as used in the first cases we had a rather long slit in the nasal mucous membrane and a comparatively large granulating area about the cut surface of the walls of the duct. In the first case the epithelium evidently thoroughly covered these granulations under the wire which was placed as a form. In the other cases this did not take place, and the results were failures. It seemed that if we could make a U-shaped incision and thus lift a flap and then turn the lower portion of the flap up and under the upper portion, we would produce a surface of mucous membrane which would not granulate, but would form the inner lip of the newly formed outlet of the duct, if after the duct had been opened a suture were passed through to hold the folded portion in place. This procedure was carried out in this case, and at the end of ten days the wire support was removed. A bougie was passed every day for several days, and then twice each week for six weeks. Never were there signs of stenosis, and there was perfect control of the tears. The only disturbance was that during excessive flow of tears there was a greater necessity for the use of the handkerchief than when the flow was carried normally into the inferior meatus of the nose.

In December of 1911 this operation was carried out for the relief of stenosis of the left duct in a man forty-three years of age. Judging by his history he had a purulent dacryocystitis four years previously. This cleared up in about two or three weeks, but there was always some trouble afterwards. The condition progressed, and for a year before examination there had been much inconvenience. The duct had been probed upon several occasions, and six months previously had been probed every

day for over two weeks. There was some relief for a short time, and then the condition was as bad as before. We were unable to pass a probe through the lower portion of the duct. A similar procedure was carried out as in the preceding case, and the results after a year were excellent. There has been no report since, but we can assume that he is well or we should likely hear from him.

After the results in the last two cases another was met in October, 1912. This patient was a robust young man of twenty-four years, who had been much annoyed by an overflow of tears from the left side following a grippy attack, with purulent discharge from the nose five years previously. The smallest probe was passed through the duct, but a larger one would not pass through the lower portion. With confidence gained in the two preceding cases, this operation was undertaken and every step progressed smoothly. The same after-care was given, yet with all we could do there was a resulting stenosis and the case was an absolute failure.

In August, 1913, a woman of forty-six years sought relief from an overflow of tears from the left eye, of a number of years' standing. The duct had been probed at various times for seven or eight years. She was a teacher and was much annoyed by having to wipe tears from her cheek. At time of examination there was little dermatitis of cheek, and only a slight overflow of secretion. The patient said that there had always been slight trouble during warm summer weather, but she wished to, if possible, be rid of the annoyance she experienced every winter. The flap operation was carried out, and when I last saw her in January there was a perfect result.

January 16, 1914, I operated upon the last case, a girl who was referred at the City Hospital by Dr. Greenwood of the ophthalmic service. There was an overflow from the left eye, and the sac contained a viscid, somewhat milky fluid. I attempted to perform the operation above described under ether, as the patient was very nervous and would not submit to an operation without a general anesthetic. After lifting the flap there was a discharge of considerable pus, and there was found to be much underlying necrotic bone. This broken down bone was removed

by a curette and the wound packed. The condition has been relieved, but it seems improbable that there will be a real cure.

In all there are too few cases to give valuable statistics, for several hundred well studied cases are necessary to give much weight to percentages. If we can judge anything by these cases, it would seem that a simple opening made through the middle fossa into the nasolacrimal duct, even with careful and persistent treatment, is liable to end in cicatricial stenosis and failure, for three of the four cases were unsuccessful. It would also seem by the use of the flap operation, which was carried out in the last five cases, we may hope for a good percentage of success, for of the five cases, three were perfectly successful, one was an absolute failure, and one was moderately successful, and this last case was one which it was impossible to successfully treat on account of the extensive bony necrosis.

THE EVOLUTION OF THE TONSILLOTOME.*

BY STANTON A. FRIEDBERG, M. D.,

CHICAGO.

The modern tonsillotome or guillotine, with its various modifications, is the outgrowth and adaptation of instruments which had for their original purpose the removal of the edematous or elongated uvula. Jonathan Wright in his *History of Laryngology*¹ states that the "inception of the Mackenzie tonsillotome may be seen on referring to Bell's *System of Surgery*, 1791, Vol. III, p. 87." Mackenzie,² quoting from the same author, but from the edition of 1783, also refers to this instrument as the one from which Physick drew his inspiration when he devised his tonsillotome. Physick himself mentions Bell's instrument as the one which he modified. The instrument referred to was the so-called uvulatome. Although considered as Bell's, I could find no claim to priority or originality in his writings, and it was of some interest to learn from what probable source he obtained his knowledge of its use. As a matter of historical fact, it was simply a modification of pre-existing uvulatomes. The appearance of the first uvulatome antedated Bell's publication by nearly one hundred and fifty years. Likewise the adaptation of an instrument of this principle to the tonsil had been made by Desault many years before Physick announced his invention.

The earliest description and illustration of the uvulatome that I have been able to find appears in the *Historiarum Anatomicarum Rariorum Centuriæ* of Thomas Bartholin,³ Hafniae,

*Candidate's Thesis, American Laryngological Rhinological and Otological Society.

1641. Under Historia 88 appears the title "Instrumentum Chirurgicum Novum pro Uvula Abscindenda." Unlike some of the new instruments of today, there is not much question of the propriety of the use of the term Novum in this instance. Previous to the appearance of this uvulatore, the scalpel, scissors and the familiar snare of Hildanus were employed in removing the diseased uvula.

Bartholin speaks of the prevalence of a certain kind of catarrh which occurs in Norway during the winter months. The disease spreads to the fauces and uvula, and involves the latter to such an extent at times as to necessitate surgical intervention in order to prevent suffocation. For the surgical relief of this condition, excision of the swollen and projecting uvula by means of the scissors is mentioned, and the author proceeds to tell how "a certain Norwegian peasant, Canute of Thorbern, had recently devised an instrument with which he excises the swollen uvula with great speed and dexterity in the twinkling of an eye." (Fig. 1.)

A somewhat literal translation of his description of the instrument is as follows:

An oblong and narrow metal plate, eleven inches in length, is provided at the extremity with a knob which makes possible a firmer hold. Gradually increasing in width, the instrument reaches about the middle a width of about two inches; thence continuing it forms a square body of one and one-half inches in length, shaped and fashioned for depressing the tongue, rounded at the end, and provided on the rounded surface with a deep groove which receives the sharp and curved edge of a blade. This blade can be extended and opened at will by means of certain appliances on the other side of the metal plate in order to receive the uvula to be excised between the edge of the blade and the wooden piece; the other side of this instrument has a movable lever which extends the metal blade attached to it, or holds back the retracted blade until its use demands its opening. Two bands are attached to this lever, one of which holds the extended blade in place, the other relaxes it when closed. The inner side of the instrument looks like a flint lock; the other side is a flat surface, which

is slightly curved, depresses the tongue, and does not interfere with the view of the surgeon; it also hides the lever and bands attached to the appliance, that a timid person may not suspicion evil."

He speaks of the method of Celsus with a *volcella*; *Aquapendens*, who used scissors, and *Hildanus*, whose instrument he describes as clumsy, slow, and disagreeable for the patient and inconvenient for the surgeon. "The first figure (Fig. 1-A) shows the instrument with the lever drawn back and the metal plate hidden in its groove; the other figure (Fig. 1-B) shows the lever raised, the blade projecting, and ready to receive the uvula. The various parts of the instrument are indicated by letters.

The manner of using the instrument was as follows: The lever (C) being raised, the metal band (D), attached to the lever at (e), was also raised so that a space was left between the sharpened part of the blade at (E) and the rounded block of wood (B). The uvula being received in the open space, the part which has a catch to hold the lever is loosened by the finger and the lever with its plate is drawn back, thus excising the uvula.

As a further recommendation it was stated that it was also particularly efficacious in the removal of warts and tumors in other parts of the body. That the instrument was in somewhat universal use is borne out by the fact that it was also pictured and described in *Scultetus' Armamentarium Chirurgicum*.

A less complex and simpler instrument was that proposed by W. T. Rau as a modification of the Thorbern uvulatome. I was not able to consult the original description, but a representation of the instrument appears in the "*Erlauterter Nuck*" of Heinrich Bass,⁴ published in 1728. Heister in his *Institutiones Chirurgicae*⁵ also shows and describes this uvulatome. It differs essentially from the one described by Bartholin in that it has a support on its under surface by which it may be grasped more firmly. The main difference, however, is found in the substitution of metal for wood, and that the blade (A) cuts from before backwards. (Fig. 2.)

The third modification of the uvulatome is that shown by Benjamin Bell.⁶ It is based on the same principle as Rau's instrument, that is, a sliding knife in a groove, passing over a fenestrated plate. His description is as follows: "An instrument for removing the uvula by excision. That part of the uvula to be removed being passed through the opening in the body of the instrument, the cutting slider, which ought to be very sharp, must be pressed forward with sufficient firmness for dividing it from the parts above." (Fig. 3.)

About this time the first application of the principle embodied in the above described uvulatomes as applied to the removal of the tonsils was made. Desault (1744-1795), whose surgical works were collected and published by his friend and pupil, Bichat,⁷ opposed the use of the knife in removing the tonsils, on account of the danger of injuring the surrounding soft parts. Accordingly he employed a modification of an instrument known as a kiotome or cystotome, an appliance that was first used for dividing cysts of the bladder. This consisted of a silver sheath which was notched into a half-moon shape at one end and at the other extremity a ring was attached on either side. A sharp edged blade passed through the sheath across the notch. The operation was performed by grasping the tonsil with a hook, pulling it forward and fitting the notched portion about so much of the gland as it was desired to remove and then passing the blade through the sheath. As with the Thorbern instrument, this one could also be used advantageously for conditions in other parts of the body. The advantages claimed were ease of application combined with rapidity and safety and little hemorrhage. If section was not accomplished at the first cut, owing to the size of the tonsil, the blade could be applied a sufficient number of times to complete the operation without removing the instrument. (Fig. 4.)

From a perusal of the literature of the period as compiled in various surgical textbooks, it does not appear that this instrument became popular or came into general use. The knife, the scissors, the ligature, with the various methods of application, in spite of the supposed dangers and inconven-

iences, continued to be the preferred methods of operation. Samuel Cooper, in his article on the tonsils in his Dictionary of Practical Surgery, 1809, after describing the various methods of operating, says: "I shall conclude this article with observing that the best modern practitioners in this country prefer a common knife to any other instrument, for the performance of this operation."

The period from 1827 to 1832 may be characterized as one in which a spirit of instrumental unrest arose as regards operations upon the tonsils. In 1827 Physick described his improvement of the wire loop operation. Smith⁸ also described his apparatus, which, as he states, bore some resemblance to the snare described by Hildanus. It consisted of a ring of iron wire with a handle attached. On one side the ring was grooved, and perforations were made in the bottom of this groove on either side and in the handle through which a waxed linen thread was passed. The advantages he claimed were that the ligature could be more easily applied closer to the base of the tonsil and that it did not cause the inconvenience that Physick's double canula caused, as the latter of necessity must be left hanging out of the patient's mouth for some time.

Alexander Stevens⁹ in this year also had presented a new canula for the tonsil operation, and it was evidently a matter of pride with him to make the claim that with his loop and canula the time necessary for the completion of the operation was shortened to twelve hours.

What with the pain and the discomfort entailed by the salivation and inability to swallow, and also the time required for the completion of the operation by the wire loop or ligature method, it must have required an excess of heroism with extreme fortitude to undergo such an ordeal. One can readily realize that the necessity must have been great before a patient would submit to the removal of the other tonsil.

Whether it was the technical difficulties of the operation, the discomfort to the patient, or whatever cause that impelled Physick¹⁰ to look for a quicker method of operation, it is impossible to say. Although, as had been said, he credits the

instrument of Bell as the one from which he developed his guillotine, the fact remains that he was quite familiar with Desault's surgical labors. This is shown by the fact that he had modified other instruments of this surgeon, and it seems probable that the idea of the application of an instrument of this kind to the tonsil was obtained from this source, while the instrument itself chosen to be modified was that used by Bell. Physick's paper directed attention to the possibilities of a quick and what was believed to be a safe operation, and from the various modifications suggested in the next few years, it evidently caused considerable thought to be devoted to the tonsil question on the part of the profession.

Dr. Physick writes: "In the operation for cutting off the uvula, Dr. Physick has, until very lately, used scissors; but being unable to complete the operation by one application of that instrument, several have been necessary to effect the division of the part. To obviate this difficulty, he determined to try the old instrument as modified and represented by Benjamin Bell in his System of Surgery. He found, however, that although he could divide with that instrument the greater part of the uvula, a portion of the membrane that covers the back part of it was not always divided, making the use of scissors necessary to cut it through. To remedy this inconvenience, he caused an instrument to be made having two plates instead of one, between which the knife was passed; but still the same difficulty was experienced in cutting through the membrane on its posterior part. He then thought of wrapping a strip of waxed linen over the semicircumference of the opening, to support the membrane until it should be divided by the knife. Thus constructed the instrument answered the purpose completely, and cut through the whole substance of the part in an instant. Dr. Physick has since used an instrument of similar construction for the removal of scirrhus tonsils. He finds it easy to cut off the whole, or any portion that may be necessary, of the enlarged tonsil in this manner. The operation can be finished in a moment's time. The pain is very little, and the hemorrhage so moderate that it has not required any attention in four cases in which he has lately performed

it. The size of the perforated end of the two plates, and of course that of the knife, must be larger in the instrument for extirpation of the tonsils than in that for truncation of the uvula." (Fig. 5.)

The instrument of Dr. Physick is so well known that a reference to the plate will enable one to recognize the various parts. A comparison with the tonsillotome of Desault will show the same underlying basic principle, although in the mechanical details the difference is apparent.

Two months later Caleb S. Matthews¹¹ published a description of his tonsillotome. Although his name has been handed down to us in connection with the tonsillotome, it is probably due to the fact that it was confused with that of Mathieu, the instrument-maker, who devised an instrument on the lines laid down by Fahnestock. By comparing the original Matthews instrument with some that bear his name, even in recent surgical catalogues, it is difficult to see any resemblance. On account of its curious construction its description is given in full. (Fig. 6.)

In the same year William Gibson¹² also described another tonsil instrument. This can, perhaps, be best understood in his own words: "Having experienced more or less difficulty in the removal of enlarged tonsils, owing chiefly to the number of instruments, such as spoons, hooks, forceps, etc., required, it occurred to me that an instrument might be contrived that would answer the purpose of all those, by keeping down the tongue, holding the gland firmly, and separating it nearly at the same moment. Such I accordingly projected and ordered made, and upon trial found to answer my most sanguine expectations. * * * It consists of a pair of forceps nine inches long, an eighth of an inch broad when shut, with extremities an inch and a half long, slightly serrated and somewhat curved, including, when closed, an oval space a quarter of an inch wide, and terminating, at the other extremity, in handles which stand off obliquely from the shafts of the instrument. A knife or blade, the length and breadth of the forceps, rounded on its cutting edge, and having a button placed perpendicularly to its axis on the opposite extrem-

ity, works backwards and forwards by means of a groove, to the extent of an inch and upwards, between the blades of the forceps, to one of which it is secured by screws. A sheath upon each end of the forceps, to keep the knife from starting off the moment it touches the tumor, completes the instrument." (Fig. 7.)

Activity in the production of new instruments then ceased until the following year, when Cox¹³ presented his contribution to the surgery of the tonsil. He states that in the methods of removal of the tonsils by ligature there is no danger of hemorrhage, but every modification of this plan is excessively painful. It may cause suffocation, particularly in cases where suffocation is threatened by the disease itself and the operation is most necessary. Other objections are that several days elapse before each tumor sloughs away and is removed from the throat. During the time that the putrefying mass occupies the fauces, an unhealthy and fetid fluid distills from it and is liable to pass into the stomach, particularly during sleep. It injures digestion. Another inconvenience is that the ligature, if made tight at once, is not capable of destroying the vitality of the whole mass. A considerable depth of surface is killed, but there remains in the center a projecting body which may cause future trouble.

The method by the knife is less painful, but danger of hemorrhage from the use of an unguarded bistoury in a vicinity so vast as the throat, agitated, too, during an operation by involuntary spasms, and where a ligature cannot be applied, is condemned by many of the profession, consequently the effort was made to make an instrument that would be under the proper guidance of the hand of the surgeon."

Another danger mentioned from the unguarded bistoury besides endangering the neighboring parts was that if the tumor had been seized with a hook, the whole gland would be likely to be extirpated and the main artery divided, producing copious hemorrhage. The advantages of the instrument are the ability to modify the motion of the knife in force and direction. His main objection to Matthews' instrument was that, although founded on correct surgical principles, it had

never been tried out, consequently its defects were unknown. (Fig. 8.)

Description of the Instruments.—The apparatus consists of several oval rings of different sizes, all adapted to a common handle, and two knives; to each ring is soldered a silver stem of one inch in length, with a screw at its extremity by which it is attached to the handle. The stem and handle make an obtuse angle with the plane of the ring (Fig. A) and are thus prevented from interfering with the motion of the knife during the operation. On one face of the ring is a dove tailed groove, having the aperture widened near the stem (at C) to admit the beak of the knife, which slides easily along the groove, from which it cannot be extracted at any other part.

The knives resemble each other, with the difference that the beaks are placed on the opposite sides of the blade. They are of the same length with the other instrument, viz., about seven inches. The handle and blade are of equal lengths; the cutting edge extends about an inch and a half from the point, and is concave. The beak (d) consists of a small piece of steel, of the shape of a pin's head, attached at right angles by a screw to the side of the end of the knife, and is adapted to move easily in the groove (c) on the face of the ring.

Directions for Performing the Operation.—In performing the operation the first object is to ascertain which ring will most exactly receive the tumor; this is to be screwed to the handle. The patient to be seated in a good light. The surgeon requires no spatula to depress the tongue. The ring may be used for this purpose until the tumor is seen. It should be then applied round it, taking care to keep the grooved face towards the cavity of the throat; then taking the knife whose beak is properly situated for the side on which he operates, the operator introduces the beak into the wide part of the groove (c). The knife should then be passed along the groove firmly upwards and onwards till it reach the opposite side of the ring, when its point must be pressed downwards, and thus round towards its starting place. The tumor falls into the mouth, and by a little adroitness may be brought out with the instruments.

D. L. Rogers¹⁴ in 1831 presented an instrument on the order of those of Matthews and Cox. He made a similar claim to surgical principles on account of the bistoury being under the guidance of the hand. "To a common handle is attached a steel ring, of sufficient breadth to admit a groove on its inner surface, deeper at its junction with the handle, with an opening on its superior surface of a half inch in length, through which a common probe pointed bistoury possessing a curve equal to half the circumference of the ring is introduced. This bistoury is attached to the handle of this instrument, fixed by a slide to a rivet, and supported on its place within the ring. To the end of the bistoury is attached a handle of sufficient size to give the operator complete control over it. The bistoury is pushed forward so that the knife is completely concealed in the ring. Then the ring is placed over the tonsil, the handle moved upward and pulled forward when it traverses the groove of the ring by dividing everything within its circumference."

In the same year J. K. Mitchell¹⁵ published the first modification of the Physick guillotine. This consisted in attaching to the upper plate a spear pointed shaft which worked by means of a spring, with which the tonsil could be pulled out and held, thus preventing its falling into the throat after excision.

One other instrument remains to be mentioned. This is the one devised by Wm. B. Fahnestock.¹⁶ His description reads: "This instrument, which I call a sector tonsillarum, consists of a piece of steel six inches long, and about one-fifth of an inch in thickness, neatly rounded and polished, with a small hole passing longitudinally through its center. One end terminates in a ring about one-eighth of an inch in thickness, and one inch in diameter. The ring is split or divided into two equal parts, which split or division extends one inch down the stem, for the passage of the knife hereafter to be described. There are two projections on the stem, one close to the ring, and the other about three inches below it, through which are small holes for the passage of the needle. The needle is about four inches in length, and works through the above named holes, on a flattened surface on the stem of the instrument. The

knife consists of a flat steel ring, which fits in the split of the above named ring, with a stem of such dimensions as will pass through the longitudinal hole in the instrument. To the end of this stem is affixed the handle. This will be better understood by reference to the accompanying drawing, which represents the instrument one-third* the proper size. For the purpose of exhibiting the different parts, the circular knife is partly drawn down as in cutting, and the needle pushed up some distance." (Fig. 9.)

Of the various instruments described, only the types of those proposed by Physick and Fahnestock have come down to us. Innumerable modifications and improvements, real and otherwise, have been made in these instruments.

Of Physick's guillotine the best known is the one that was made by Mackenzie in the way of simplification and the use of a reversible handle. The latter, however, in recent times has been shown to be a needless accompaniment of the original instruments. With Fahnestock's instrument many more names are associated, chief among them being those of Guer-sant, Chassaignac, Charriere, Mathieu and Maissonneuve. These improvements have consisted chiefly in varying the form of the opening, the addition of extra prongs to the transfixing part of the apparatus, or changes in the handle. The swing of the tonsil operative pendulum has recently relegated instruments of the Fahnestock model to a secondary position, the Physick-Mackenzie type being in the ascendancy. Of more than passing interest is the fact that the main principle of the tonsillotome as it appears today was evolved out of the mind of an untrained peasant before the middle of the seventeenth century.

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*In the sketch the instrument is shown somewhat larger for the sake of clearness.

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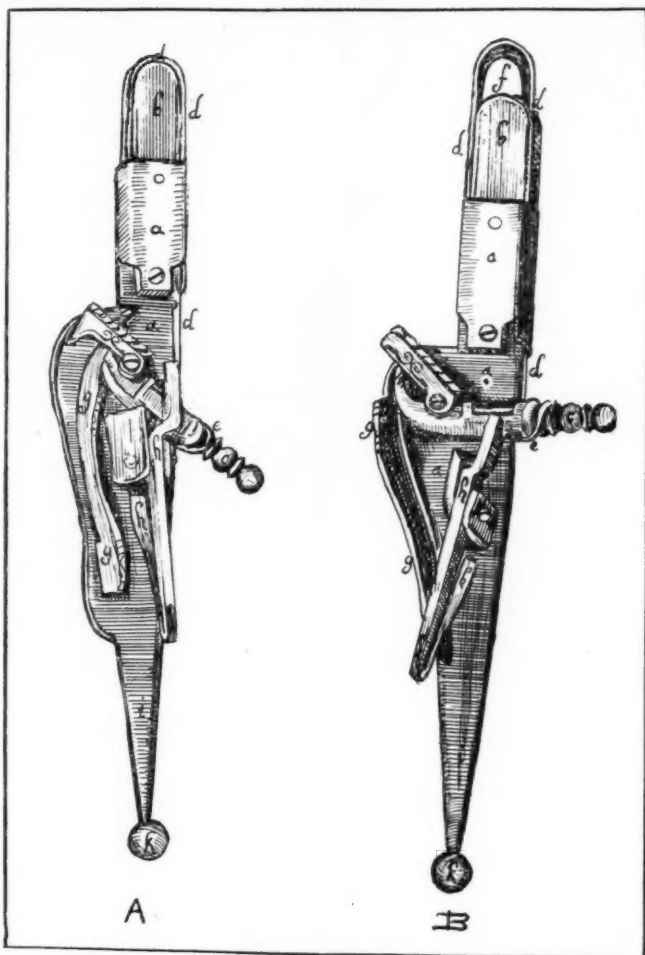


FIGURE 1.

- a, a, a, a, a. Metal plate.
- b, b. Rounded piece of wood.
- c, c. Lever.
- d, d, d, d, d, d. Metal band lying close around the plate and piece of wood.
- e, e. Metal band attached to lever.
- E. Curved and sharpened portion of the metal band.
- f. Space between blade and piece of wood.
- g, g, g, g. Hook No. 1, holding lever.
- h, h, h, h, h, h. Hook No. 2, retracting lever.
- i, i. Handle of instrument.
- k, k. Round knob attached to end of handle.



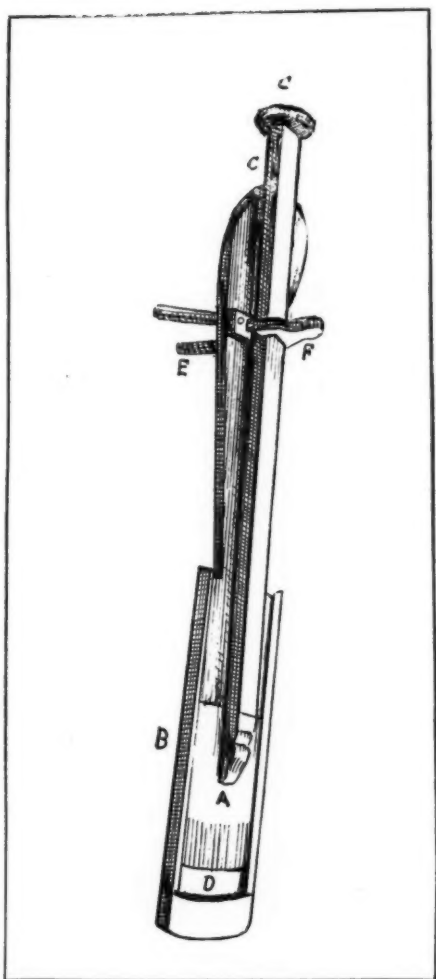
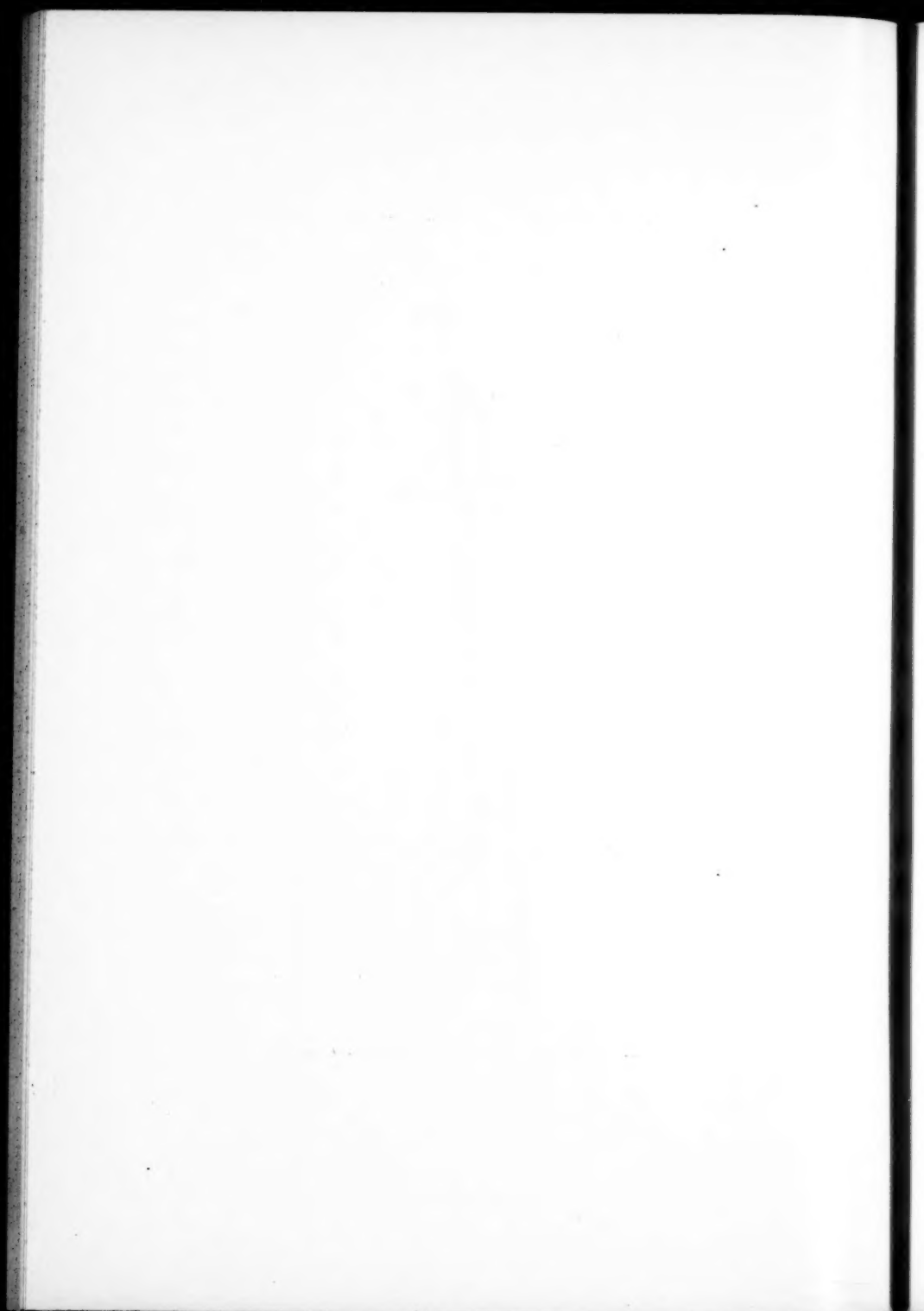


FIGURE 2.



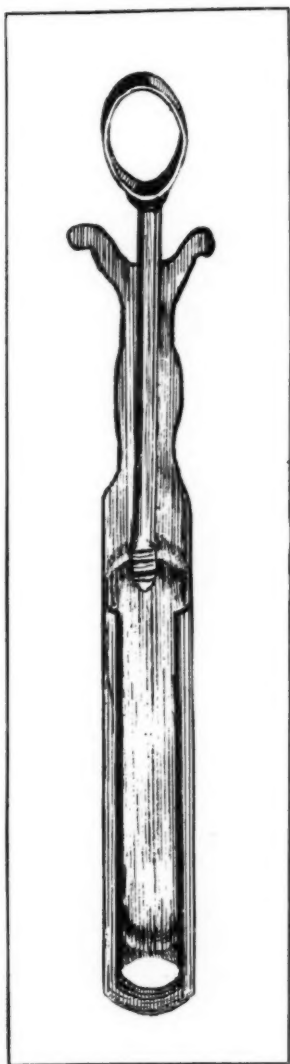


FIGURE 3.



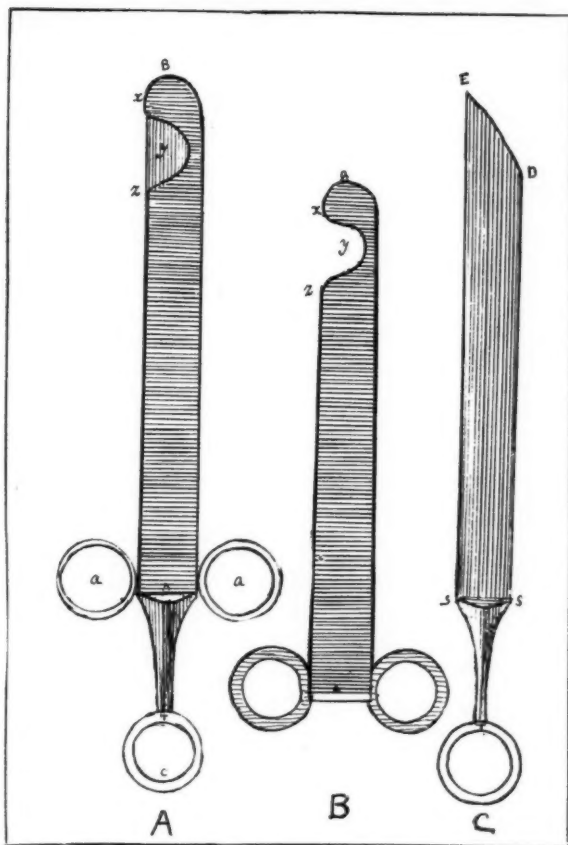


FIGURE 4.

Figure 4-A. Kiotome seen as a whole. A, B. Sheath of silver which receives the blade. a, a. Rings soldered to the sheath. y. Portion of the blade seen exposed in the notch. A, T, C. Plate of steel ending in a ring and serving as a handle to the blade. B, C. Total length of the instrument, 9 inches.

Figure 4-B. Sheath of the kiotome seen apart from the blade. x, y, z. Semicircular notch, 9 lines in diameter. A, B. Total length of the blade, 6 inches, 4 lines; width near the rings, 6 lines; near the notch, 7 lines. E, x. Distance from the end to the notch, 7 lines.

Figure 4-C. Blade of the kiotome seen without the sheath. E, s, D, s. Dull sides of the blade, thinner than in the middle. D, E. Edge of the blade obliquely directed, 10 inches in length. s, s. Border serving to prevent the blade from entering too far into the sheath. E, s, s. Length of the blade, 18 lines. T, s, s. Plate of steel ending in a ring supporting the blade, of which the width is $7\frac{1}{2}$ lines near the plate, 6 lines near the edge.



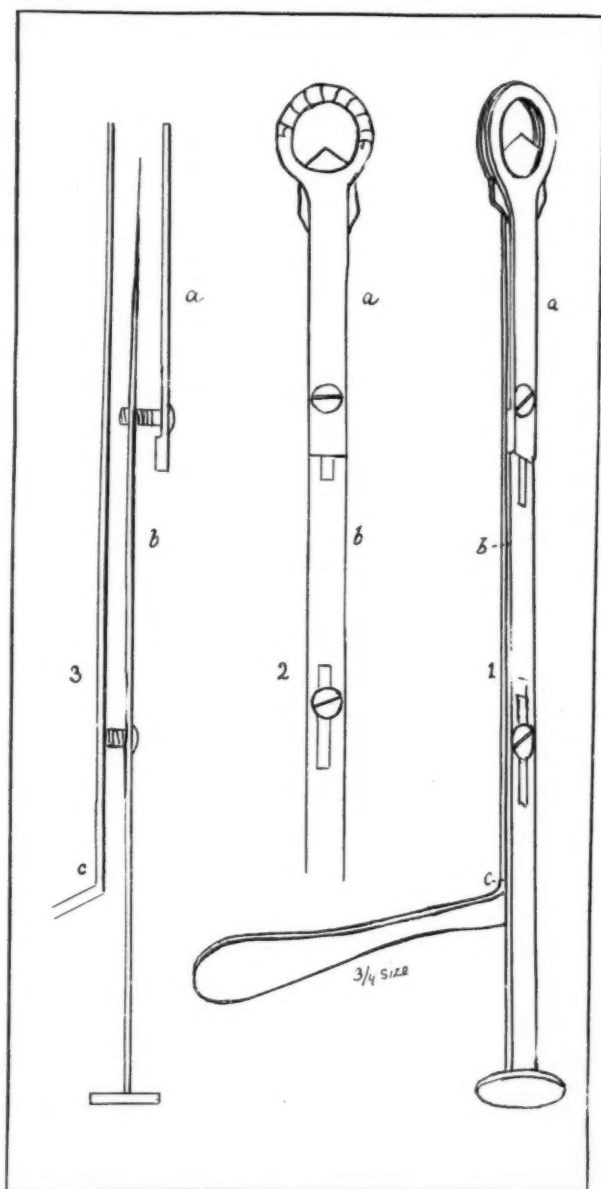
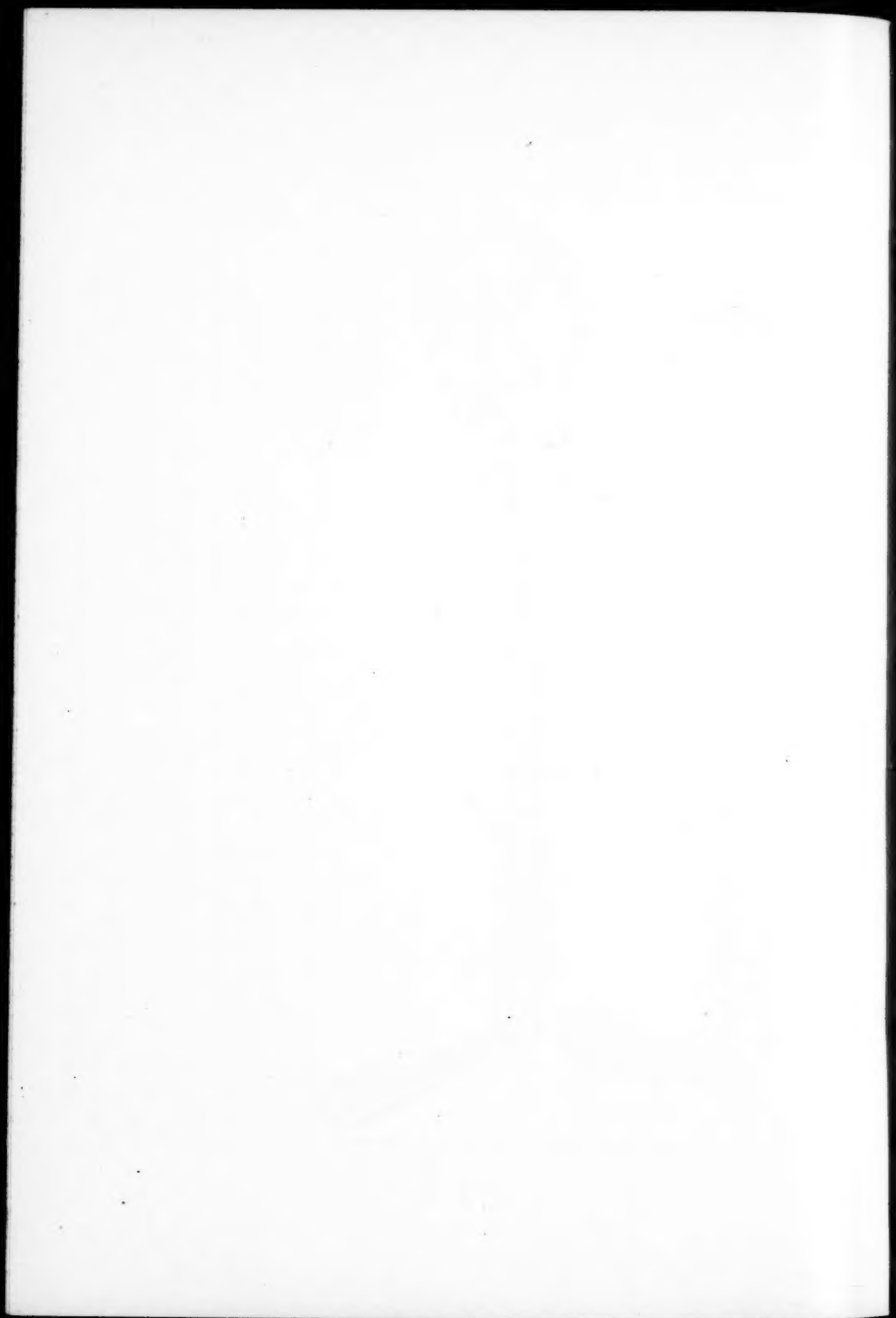


FIGURE 5.





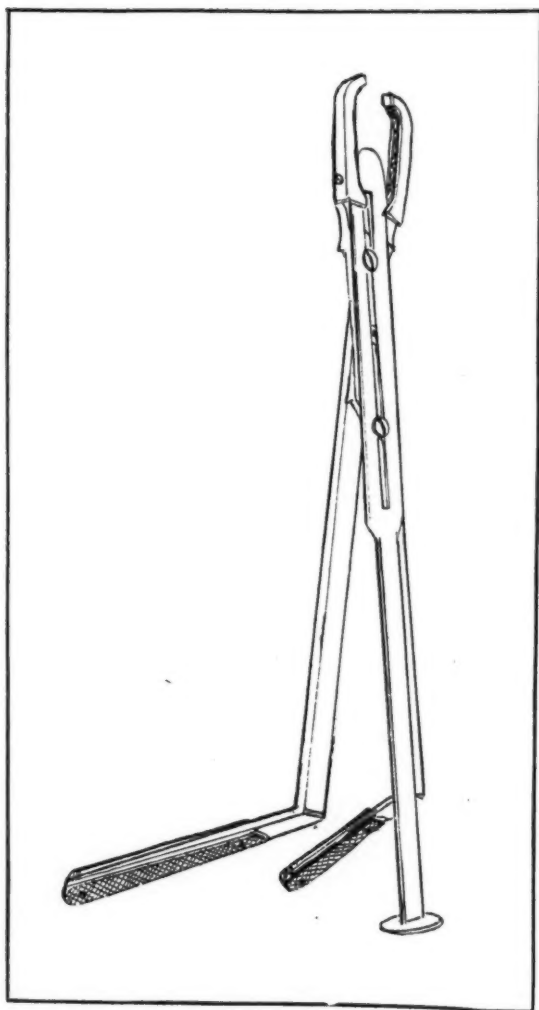
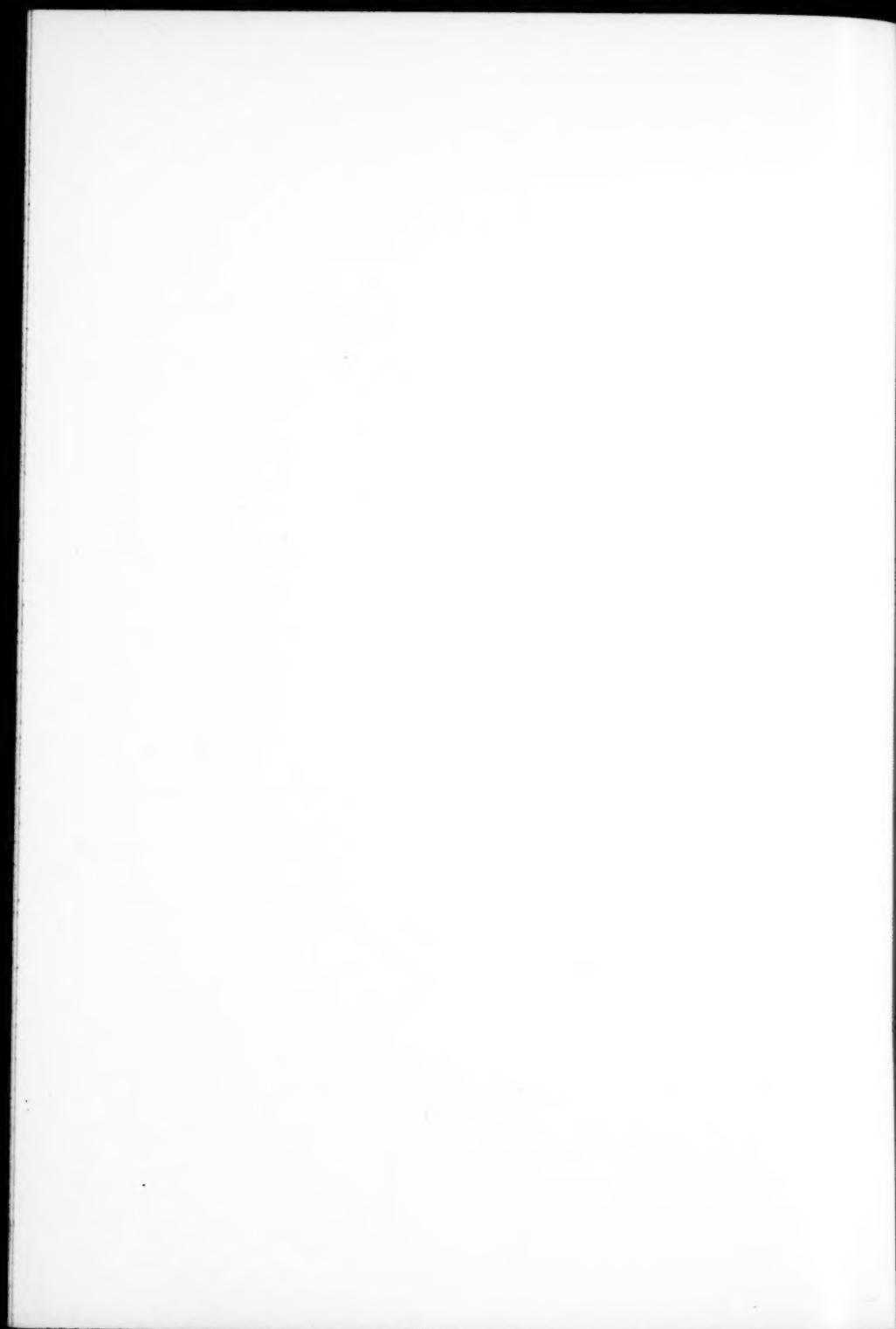


FIGURE 7.



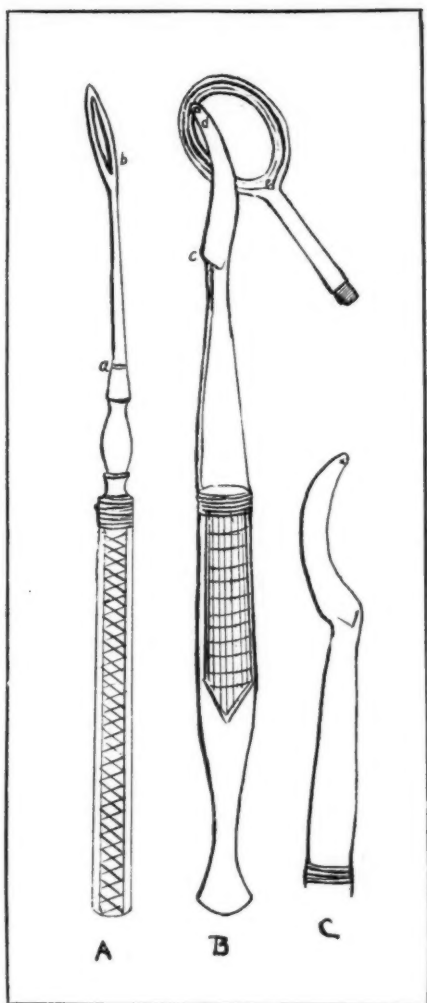
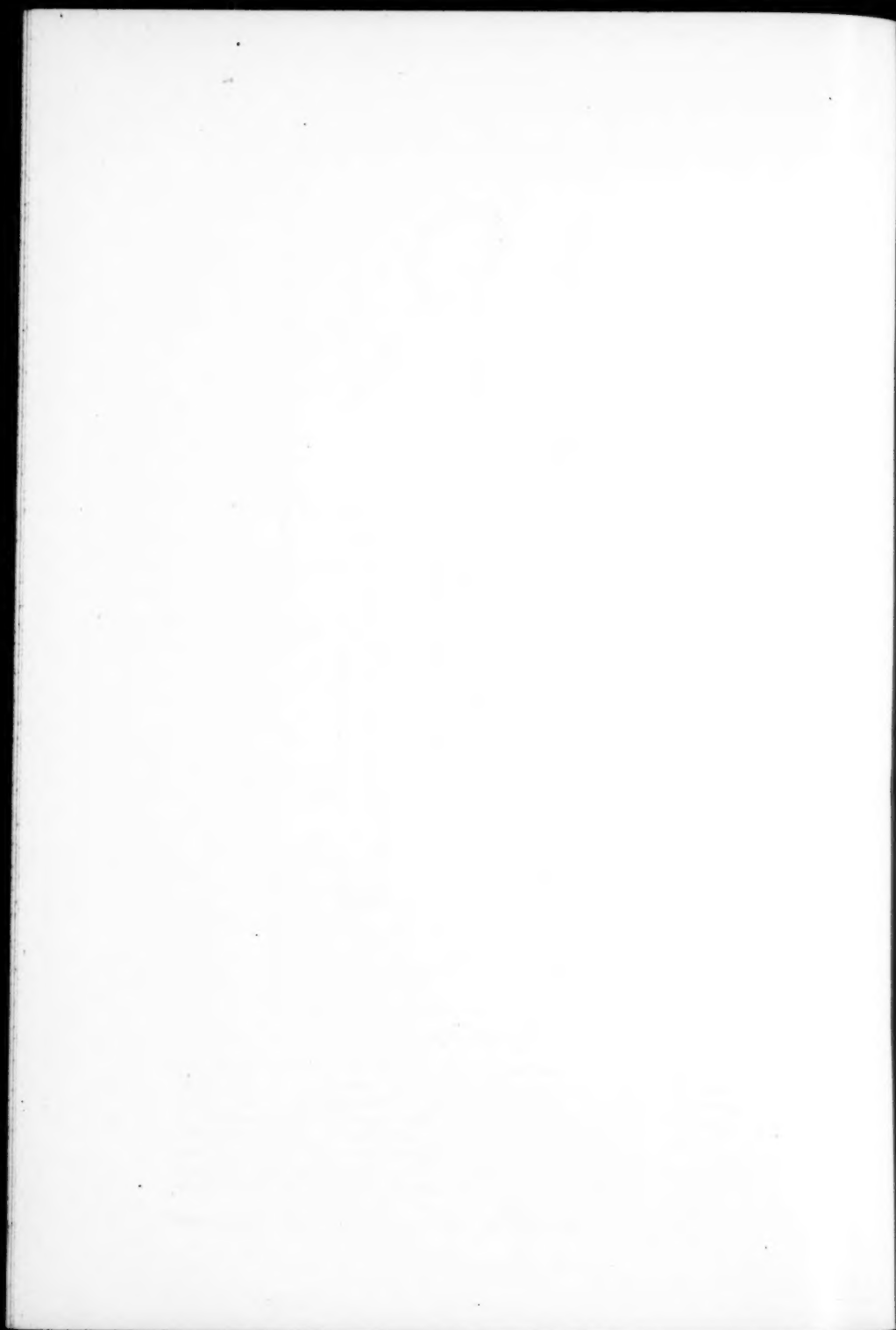


FIGURE 8.

Figure A. The instrument, by the ring at the end of which the tonsil is surrounded and held during the operation. a. The point at which the silver stem is screwed to the handle. b. The place where the silver stem is soldered to the ring at an obtuse angle.

Figure B. The tonsil knife for the left side. c. The termination of the cutting edge, which is concave to the point. d. The beak adapted to the groove on the face of the ring. e. The groove which conducts the beak of the knife around the tonsil. It is here a little widened to receive the beak.

Figure C. A convex edged knife (on some accounts not so good as the other).



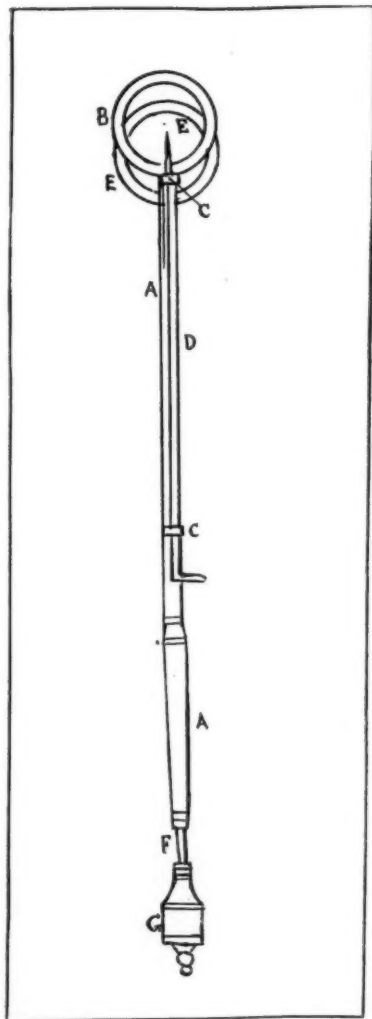
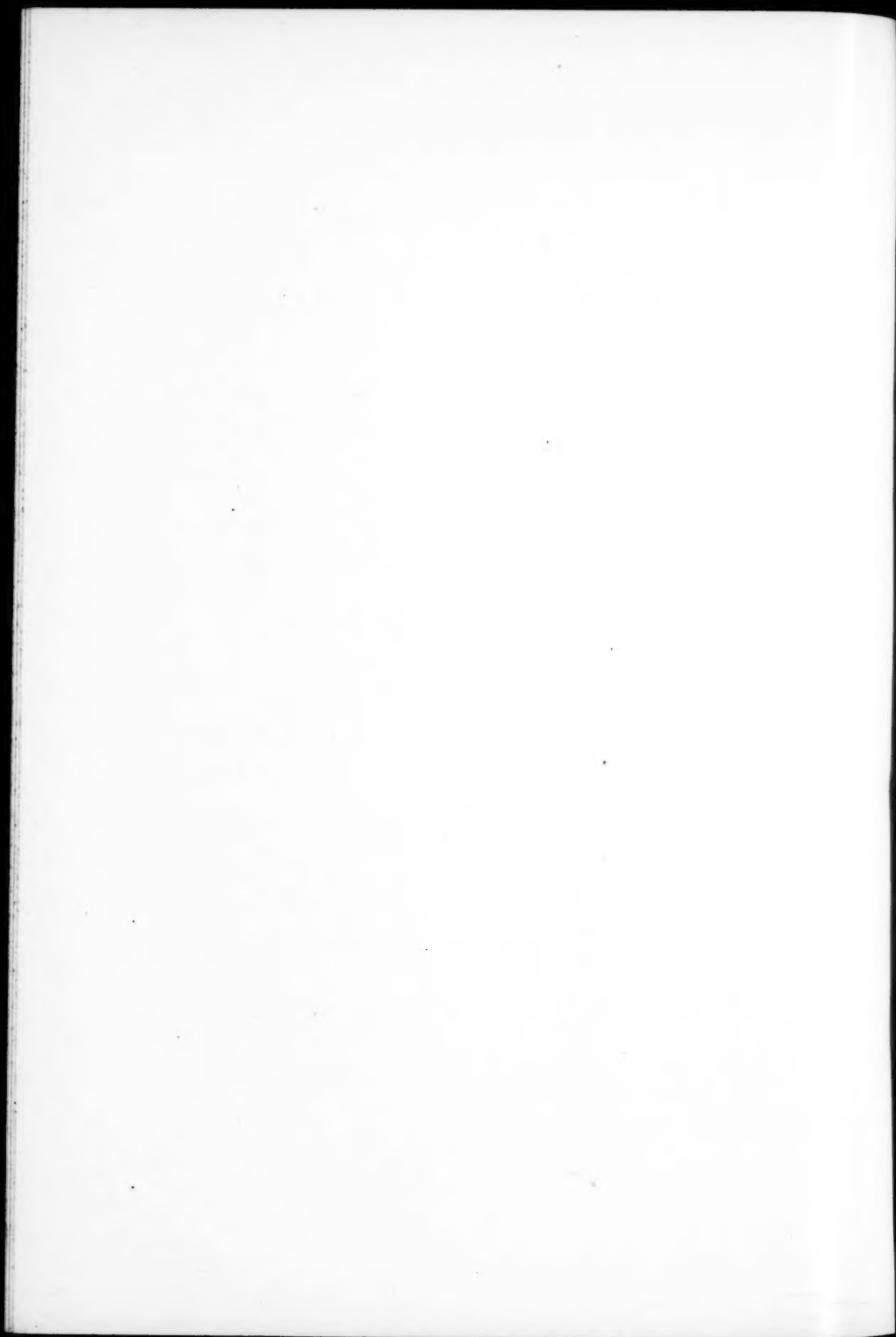


FIGURE 9.

A. A. The stem of the sector. B. The ring. C. C. The projections on the stem, through which are holes for the passage of the needle. D. The needle. E, E. The circular knife, to which is affixed the internal and upper half of which is sharp. F. The stem of the circular knife, to which is affixed the handle. G. The handle.

Mode of operating with the sector tonsillarum.—If it be the left tonsil that is to be removed, depress the tongue with the forefinger of the left hand; introduce the sector, pass it over the tongue, with the needle side upwards, and as the tonsil is approached, so turn it that the needle looks towards the right side of the mouth. Apply the ring over the tonsil, and with the thumb or forefinger of the left hand pass the needle through the base of the gland. Now incline the stem of the sector a little towards the right side of the mouth, or in a line with the angle of the jaw, and excise. When the right gland is to be removed, the mode of operation is reversed.



XXVI.

CHRONIC INFLUENZA OF THE NOSE AND
THROAT.*

BY LORENZO B. LOCKARD, M. D.,

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At various times cases have been recorded in which influenza bacilli, either in pure culture or in symbiosis, have been found during a period of several months, and in some instances for as long as one and two years.

Usually these have been cases of chronic bronchitis, pneumonia or tuberculosis, although a few have concerned individuals with rhinitis and otitis media.

The patient whose history I herewith record presents the unique spectacle of an infection of the nose and throat lasting twelve years, during all of which time cultures of the bacillus influenzae have been obtainable whenever sought for, whether or not subjective symptoms of the disease were present.

The chronicity of this case, its various clinical manifestations, and resistance to all surgical and medicinal procedures, together with the conjectural field it offers concerning recurrent attacks of tonsillitis, quinsy, coryza and sinusitis, make it well worthy of report.

HISTORY.

The patient, when he first came under my observation because of a peritonsillar abscess, was thirty-five years of age.

For ten days after evacuation of the pus there was severe prostration, greatly exceeding that which one commonly sees in this condition.

Unfortunately a bacteriologic examination was not made, for it was not until later that its importance became manifest through the obtaining of the following history:

In 1902, seven years before the attack in question, while serving as an interne in the Presbyterian Hospital of New

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York, he suffered from a severe attack of influenza, which terminated, after seven weeks, in a peritonsillar abscess.

An examination of the pus, made by the hospital pathologist, Dr. Geo. A. Tuttle, showed a pure culture of the bacillus influenzae. In the succeeding two years, three examinations of secretions from the crypts of the tonsils gave similar findings. One of these was made during an attack of follicular tonsillitis; the others while he was in apparently normal health.

Previous to the original attack he had been moderately robust; from then on he was constantly subject to more or less severe attacks of coryza, pharyngitis, tonsillitis and quinsy, each being characterized by so-called grippal symptoms.

In the course of seven years he had twelve peritonsillar abscesses, involving sometimes one, at other times both tonsils, and an unknown number of attacks of follicular tonsillitis. In 1904 he contracted pulmonary tuberculosis, which disappeared after one year's residence in the West.

Four months after the attack which first brought him under my observation, he had a severe bilateral follicular tonsillitis, accompanied by a vesicular eruption on the velum palati, the vesicles resembling small grains of sago. During this seizure, also, the constitutional symptoms were out of all proportion to the amount of local involvement.

This bore a striking resemblance to the cases of pharyngeal influenza described by Escat.¹

In the following November his tonsils were removed, and three days afterward a false membrane, similar in appearance to a mucosa cauterized by silver nitrate, appeared upon the palate and rapidly spread until the pillars on both sides, the uvula and posterior pharynx were completely covered.

This membrane, despite vigorous antiseptic treatment, persisted for ten days, and gave pure cultures of the bacillus influenzae. During the entire period of convalescence there was marked prostration with severe pain in the joints, head and back, with a temperature that ranged from 100° to 103°. A second examination of this membrane, after seven days, again showed the influenza bacillus.

In the succeeding two months three cultures from throat swabs were made by Dr. Henry S. Denison, all with similar findings.

Thorough cleansing of the pharynx and tonsils immediately

before the cultures were taken, with alkalin washes, hydrogen peroxid, argyrol, and iodine, had no appreciable effect in diminishing the number of bacilli.

An autogenous influenza vaccine was administered at this time. Because of his great susceptibility it was found necessary to begin with a dose of only 1,000,000, which was gradually increased, but tolerance could not be gained for more than 10,000,000. According to Allen,² this dosage is entirely inadequate. He recommends 50,000,000 as an initial dose in acute cases, and claims no result can be anticipated in chronic ones until from 2,000 to 5,000 million are given.

Even with the small dose given in this case there was always some reaction; two to three degrees of temperature and rather severe joint pains and general prostration for from forty-eight to sixty hours.

No influence whatever was observable upon the attacks of coryza from which he frequently suffered, and although positive cultures from the throat were always obtainable, he had no additional attacks of pharyngitis.

In April, 1912, he contracted typhoid fever, and on the twelfth day developed a severe maxillary sinusitis. Until this time there had never been any symptoms referable to the nose, aside from the recurring attacks of acute coryza. The nose was cleansed and a straight trocar used for perforation of the antrum, through which a platinum needle was passed, thus making it reasonably certain that outside contamination was avoided.

A pure culture of the bacillus influenzae was obtained. The antrum rapidly healed. Ten days later a small alveolar abscess appeared over the second bicuspid; as the tooth was alive and the skiagram did not show necrosis, and all symptoms disappeared, no special treatment beyond incision was indicated. An examination of the pus could not be made.

Six months later, while in otherwise normal health, there was a recurrence of the antral suppuration and again the influenza bacillus was obtained, this time in symbiosis with the streptococcus; spirilla and fusiform bacilli were also found. This examination was made by another pathologist, Dr. Roscoe Baker, of Denver.

All subjective symptoms disappeared after a few irrigations, and a skiagram showed nothing abnormal.

At this time he went to Southern California for the winter,

and while there a third attack developed. A month later a permanent nasal opening was made by Dr. S. McCuen Smith of Philadelphia, and considerable pus evacuated.

An examination of the pus was not made at the time of operation, but three weeks later a negative swab was taken. There was marked improvement in the general health, and the antrum remained quiescent until the first week in July, three months after the operation, when suppuration occurred, accompanied by prostration, malaise and slight temperature, 99 to 99.5 degrees in the afternoon.

An examination by Dr. Baker showed the influenza bacillus in large numbers, in connection with the staphylococcus.

Again a very small alveolar abscess appeared over the second bicuspid, and a skiagram showed necrosis of the alveolus about the second bicuspid and first molar and extending to the floor of the antrum.

On July 28, 1913, these two teeth were extracted, and the necrosed portion of the alveolus and antral floor resected.

A culture taken from the extracted molar, at the bifurcation, showed influenza bacilli and staphylococci.

The opening was so large that three months elapsed before it was thought advisable to adjust a permanent plate and drainage tube.

On January 30, 1914, five months after the excision of the floor of the antrum, there was still a slight discharge. Cultures from this showed influenza bacilli in greatly reduced numbers and staphylococci.

A thorough search of the literature fails to reveal an analogous case, although an amazing number have been recorded with chronic infection of the lungs and bronchi.

A study of this case leads to a consideration of the following points:

1. The prevalence of influenzae bacilli in nonepidemic periods.
 - (a) In the secretions of normal individuals.
 - (b) In the secretions of patients suffering from other diseases.
2. The frequency of chronic influenza.
 - (c) Of the lungs and bronchi.
 - (d) Of the nose and throat.
3. Influenza carriers: their role in the causation of sporadic cases and of recurring attacks in the individual.

I.—PREVALENCE OF BACILLI IN NON-EPIDEMIC PERIODS.

The ubiquity of the influenza bacillus is much greater than commonly supposed.

(a) B. Scheller³ examined the secretions from the throats of one hundred and nine normal persons and found the bacillus influenzae in twenty-five, fifteen of whom gave a history of at least one attack of grip.

Holt,⁴ in an examination of forty-three healthy persons, had sixteen positive and twenty-eight negative cultures.

Two of twenty throat swabs taken from normal persons by Davis^{5 6} were positive.

Thus in a total of one hundred and seventy-two normal individuals, the bacillus was found forty-three times, or in 25 per cent.

(b) In patients suffering from other diseases, and not known to have influenza, the bacilli are found in a large percentage.

Wollstein,⁷ by swabbing the throat, recovered the bacillus in sixteen of thirty-seven cases of pneumonia; in eleven of thirty-four cases of bronchitis; in eight of eighteen cases of measles; in eight of sixteen cases of tuberculosis, and five times in sixty-five cases of other diseases.

Lord,⁸ during non-epidemic periods, in examining cases of what were presumably ordinary coughs, found influenza bacilli in sixty out of one hundred cases. In twenty-nine of these they were present in overwhelming numbers.

Dr. L. Emmett Holt⁴ had cultures taken of the throats of all the inmates of the Babies' Hospital in New York, including nurses and resident physicians, to determine what value could be attached to throat cultures as a means of diagnosis, and to ascertain the responsibility of influenza for the frequency with which respiratory infections occur in hospitals.

One hundred and ninety-eight persons were examined:

Suspected cases	42
Nonsuspected cases	43
<hr/>	
Cultures positive	85
Suspected cases	16
Nonsuspected cases	97
<hr/>	
Cultures negative	113

A summary of these cases, with those reported by Scheller,³ Davis,⁵ Allen,⁶ Boggs,⁹ and Grassberger, show that out of four hundred and twenty-seven patients, two hundred and fifteen, or 50 per cent, harbored the organism of influenza.

II.—CHRONIC INFLUENZA.

Whether or not chronic influenza is to be considered a common disease depends upon whether the presence of the Pfeiffer bacillus is regarded as essential to a diagnosis. By a majority of the authors the clinical symptoms, even without bacteriologic confirmation, are deemed sufficiently characteristic to be conclusive.

(c) These chronic infections are usually of the lungs and bronchi, although in a small number the nose and throat seem to play the predominant role. The usual period during which the bacilli are present in the sputum following an acute attack cannot be definitely stated. In typical cases they are present only for a few days and disappear with the disappearance of the purulent secretions.

Leichtenstern¹⁰ says: "Certain bacteriologic investigations make it likely that the germs in convalescence may remain in an attenuated form perhaps fourteen days or longer in the various cavities, and later on again become virulent." He observed two patients in whom they persisted to the time of death, two years after the acute attack.

Osler¹¹ has seen three cases in which influenza bacilli persisted in the sputum for two and one-half years, and Ortner¹² reports six similar cases, four of which lasted respectively three, four, five and nine years.

Innumerable cases similar to the foregoing could be cited.

(d) Proved cases of chronic nasal and pharyngeal infection are rare.

As with general influenza, a chronic infection of this type may be assumed in the presence of certain clinical symptoms, such as those described in detail by Goodale¹³ and Frank,¹⁴ but those in which bacteriologic substantiation has been given are extremely rare.

Granby¹⁵ has described a case of purulent rhinitis of four years' duration, in which influenza bacilli were found.

Cultures of influenza were obtained from the nasal secretions of two chronic cases observed by Lord. In each case the

nose was examined by Dr. A. Coolidge, Jr.; in one there was atrophic rhinitis, in the other a chronic purulent rhinitis. The influenza bacilli, in both instances, were associated with pneumococci and pyogenic cocci.

Lindenthal¹⁶ reports the only two cases of chronic sinusitis, bacteriologically proved, that I have been able to find, and in neither instance is the duration of the suppuration known. His description, however, implies that they are both of long standing.

In one case an autopsy was held upon a patient dead of some chronic disease. The frontal cells and right antrum were filled with pus which gave a pure culture of the bacillus influenzae.

The second autopsy was upon a patient dead of croupous pneumonia, who had had a cough and expectoration for one year. Influenza bacilli were found in the lungs. The right antrum and sphenoid were filled with pus: that from the sphenoid showed influenza bacilli, pneumococci, and staphylococci: the antral pus contained only diplococci. A case of chronic influenzal sinusitis of at least four and possibly twenty-three years' duration, has been observed by my colleague, Dr. Roscoe Baker.

This patient, although a physician, has refused to submit to either a rhinologic or X-ray examination, hence the diagnosis must rest upon the subjective symptoms and bacteriologic examinations. These, however, are so definite as to warrant report.

In 1891 he had a severe attack of influenza, accompanied by symptoms of maxillary sinusitis. One year later pain developed in the right cheek, with considerable swelling below the eye and a copious purulent discharge from the corresponding nostril. There was gradual improvement, and at the end of two weeks he had fully recovered.

Four years ago, while studying at the Polyclinic in Chicago, there was a recurrence of these symptoms, and an examination of the pus, made by himself, revealed the influenza bacillus. His findings were verified by Drs. Rosenow and Murphy. He was given an autogenous vaccine with some benefit, but the discharge has since persisted and amounts to about one-half an ounce daily.

On July 15, 1912, this pus was examined by Dr. Baker, who

found influenza bacilli and the staphylococcus albus and aureus.

In February of the present year the influenza bacilli were still present, associated with the staphylococcus mucosus.

In subacute cases the bacilli in pure culture have been found in a few instances.

Lindenthal has had two such cases: one of three weeks' duration, and one in which the exact duration was unknown. In several additional subacute cases he found the influenza bacillus in symbiosis with bacillus coli communis.

In acute cases they have often been found, but not as frequently in recent years as during earlier epidemics.

According to Hajek,²⁰ the influenza bacillus is the most frequent cause of sinus inflammation, and Zarnico²⁴ places it after the pneumococcus and streptococcus in the order of their relative frequency in the causation of suppuration.

Weichselbaum²⁵ claims that the sinuses are always affected during attacks of acute influenza, and Lindenthal demonstrated bacilli in the antral secretions in all of seven acute cases which he examined postmortem.

In these cases as well as in influenza otitis there has been a steady microbic evolution. Primarily the bacillus influenzae was often found in pure culture: later it appeared in conjunction with the micrococcus catarrhalis, both organisms occurring in the same patient, or one in one and one in another. Today the micrococcus catarrhalis is the one usually found, and the bacillus influenzae only rarely.

Manwaring-White,¹⁷ in an epidemic in 1909, did not once find the Pfeiffer bacillus in sinus cases, but in every one the micrococcus catarrhalis was present.

Today the majority of sinus cases following what clinically is the grip do not show the influenza bacillus, but the micrococcus catarrhalis, pneumococcus and streptococcus.

The same is true regarding acute otitis. As early as 1892 Scheibe¹⁸ demonstrated the bacillus in the aural discharge, but today it is rarely found.

Holt made cultures of twenty-nine cases of acute otitis after paracentesis and did not find influenza bacilli in one, yet fifteen of these patients gave positive throat cultures. In eighty-five persons giving influenza cultures, there were seventeen cases

of acute otitis, yet bacilli were not once found in the aural discharge.

These results seem to show that in general the relation of influenza to these conditions is the same as that which obtains in measles: the general infection furnishes the proper conditions for the development of other organisms already present.

These facts make clear the reason for the extreme rarity of chronic infections of the sinuses with demonstrable influenza bacilli, although the original cause of the infection may have been an undoubted influenza.

III.—PRACTICAL BEARING OF QUESTIONS CONSIDERED.

The questions which have been considered have a strong practical bearing upon two little understood problems: the eruption of sporadic cases, and the frequent recurrence in certain individuals of local symptoms which may be clinically diagnosed as influenza, although unattended by constitutional manifestations.

It becomes almost certain, as we study the disease, that the explanation of its existence, during nonepidemic periods, is the same as that governing diphtheria, enteric fever, cholera, etc.; that there are influenza carriers, who, showing no symptoms of the disease, may carry and distribute the specific germs without necessarily falling victims to them themselves. Such patients, however, usually suffer from recurring attacks of rhinitis, tonsillitis or bronchitis, which at one time may apparently be idiopathic in origin, at another typically grippal.

The role of diphtheria carriers in the dissemination of that disease is now fully recognized, and we know that patients harboring the Klebs-Loeffler bacillus may remain well a long time and then fall victim to the disease; and the same is even more true of influenza, for influenza infections do not protect, but rather predispose to recurrences.

Park and Williams¹⁹ upon this subject say: "Sporadic cases or the sudden eruption of epidemics in any localities from which the disease has been absent for a long time, may possibly be explained by assuming that the bacilli, as already mentioned, often remain latent in the lung or bronchial secretions for many months, and perhaps years, and then become active again, when under favorable circumstances they may be communicated to others."

Osler¹¹ voices this view as follows: "Some patients who have once suffered from influenza seem to be especially liable to recurrences, which may be due to the persistence of the bacilli, undetected, in the upper parts of the respiratory tract, causing autoreinfection.

"In interepidemic periods the respiratory infection with influenza bacilli cannot be distinguished from infections with other organisms, such as micrococcus catarrhalis, without a bacteriologic examination."

Jordan²¹ writes: "Influenza sometimes exists in a chronic form, in which the bacilli appear in the nose and throat secretions for months. The microorganism is also found in a considerable portion of healthy persons. Its presence and persistence in the nasal and bronchial secretions of convalescents and chronic cases, in the sputum of consumptives, and even in the mouth and nose of healthy persons who have been in contact with influenza patients, affords a ready and plausible explanation of many of the phenomena of distribution and transmission."

Madison²¹ reports a case that shows the danger of infection being transmitted in this way. A woman suffered for twenty-two years with a cough, and during a period of twenty years had recurrent hemorrhages. The daily expectoration was between six and eight ounces. No tubercle bacilli were found, and the Moro tuberculin test was negative, but the bacillus influenzae was present in almost pure culture.

The father and mother, and all of her seven brothers and sisters, contracted chronic bronchitis, as well as four of her ten children. An additional child died at nineteen months from some respiratory disease.

Positive evidence is lacking that these respiratory conditions were all influenzal in origin, but there are strong reasons for believing them to have been so.

Outside the body the bacilli are of short life. In hemoglobin cultures they remain alive for as long as seventeen days; in blood bouillon cultures at 20° C., they retain their vitality only for from two to three weeks.

Neisser²² was one of the first to show that this vitality is greatly increased by association with other organisms.

He has demonstrated that the best "nurse" is the bacillus prodigiosus, and succeeded in keeping the influenza bacillus

alive for twenty generations, when the two were grown symbiotically.

There are reasons for thinking that killed cultures of streptococci may increase the virulence of the bacillus for animals.

He concludes: "If this proves true, it opens up an interesting field for speculation as to the origin of the epidemics of influenza, suggesting that Pfeiffer's bacillus may live possibly for long periods as a harmless saprophyte in conjunction with other bacteria, and be suddenly raised in virulence as a result of its entrance into the body in conjunction with the streptococcus or some other pathogenic bacteria."

Their frequent discovery in normal throats, and the warranted supposition that they remain latent in the sinuses for long periods of time, indicates, as pointed out by Davis, that they may exist as organisms with a potential pathogenic function awaiting an opportunity favorable for development.

This favorable opportunity develops under certain climatic and bodily conditions, when, owing to lowered resistance, or the accidental entrance of other organisms, the bacilli increase in number and virulence, and become capable of transferring the disease to others, or of producing symptoms in the individual who has previously harbored them with impunity. The case cited by the author gives considerable weight to this view.

TREATMENT.

No treatment, aside from that which depends upon raising the resistance of the individual, has been effective. Vaccines have been largely unsuccessful. Only a few cases have been reported in which any effect whatsoever has been observed.

Fisher²⁶ reports one case successfully treated with an autogenous vaccine made from the influenza bacillus and the pneumococcus, and Granby, in the case of chronic rhinitis previously referred to, noted great improvement from a vaccine, but a complete cure was not obtained.

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XXVII.

A STUDY OF VINCENT'S ANGINA.

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Vincent's angina is an inflammatory membranous process, deepening into ulcerous, and sometimes gangrenous, manifestations in the mouth, tonsils, pharynx, and, more rarely, in the larynx or trachea. It is caused by the fusiform bacillus and spirillum bearing Vincent's name.

Various names have been given the affection by different writers, such as "ulcerative angina and stomatitis," "ulcerous angina," "ulceromembranous angina," "spirocheten-bacillen angina," and "diphtheroid angina."

As far back as 1879 F. Y. Clark¹ described a bacillus, curved and motile, which may have been the fusiform bacillus. He is quoted by Miller,² of Berlin, who four years later, in 1883, wrote on bacteria of the mouth and described the fusiform bacillus and the spirochete. The bacillus Miller considered a spirillum, calling it spirillum sputegenum, and the spirillum he identified with the spirochete dentium. In the same year Lingard and Batt³ described an affection of the tongue and mucous membrane in calves strongly resembling Vincent's angina, and later Lingard⁴ found a bacillus forming long threads in calves, in monkeys, in horses with gangrenous pneumonia, and in man. By some, precedence in reporting the disease is given to Rauchfuss,⁵ who in 1893, in a report of patients in a children's hospital in St. Petersburg, described the bacteriology in certain cases of ulceromembranous angina, and published photographs of the bacilli and the spirilla now identified with Vincent's angina. The following year Plaut⁶ described the same organisms in ulcerous angina, and about the same time Conheim published his findings along this line. In 1896 Vincent⁶ published a full description of the fusiform bacilli and

the spirilla in hospital gangrene, and called attention to the presence of them in certain ulcerative anginas. Bernheim⁷ in 1897 made a report of thirty cases with the organisms present, though uncertain of their etiologic influence. In 1898 Vincent⁸ published a report of fourteen cases. In 1899 Freyche⁹ published a study of the diphtheroid and ulcerous angina of Vincent, and in the same year Fotiadès¹⁰ published an article on stomatitis and angina with evidence of the fusiform bacillus of Vincent. Athanasiu¹¹ in 1900 published a paper on ulceromembranous angina with the fusiform bacilli of Vincent. In 1901 Nicolet and Marotte,¹² in an exhaustive report with references to sixty articles, described the morphology of Vincent's organisms. In 1902 Mayer¹³ described a case, and in 1903 Fisher described two cases. In the latter year Auch¹⁴ discussed the distinctive influence of the disease, and in the same year Conrad¹⁵ made a thorough review of previous articles. Ten years had passed since Rauchfuss made his report in the St. Petersburg hospital, and twenty since Miller published his studies and referred to a previous finding by Clark. During this period many foreign writers had taken up the subject, but American writers had given it scant attention. Vincent,¹⁶ writing in 1905 on the symptomatology and diagnosis, referred to more than eighty articles, but only two of them were by Americans. As evidence of the lack of attention to the disease in this country, Crandall's report¹⁷ in 1904, of what he assumed to be the third case in the United States, may be noted, the first case reported in the United States being that of Emil Mayer,¹³ of New York, in 1902, to which reference has already been made. More recently, however, numerous articles by American writers have been published, and knowledge of the disease in this country is becoming more general.

ETIOLOGY.

The conditions in which the patient lives contribute much to causation. Though one finds cases among those whose sanitary surroundings are beyond criticism, by far the greater number are among those whose surroundings or whose work are of an unsanitary nature. The disease¹⁸ is more common in malnourished, and it frequently follows measles, scarlet fever, whooping cough, and diphtheria. Halsted¹⁹ emphasizes an

error in not recognizing the deep and, at times, gangrenous ulcerations of the tonsil and mouth in late stages of diphtheria and scarlet fever as due to Vincent's organisms rather than to the Klebs-Loeffler bacillus and the streptococcus of the original infection. That is, he regards the deep, necrosing ulcerations as caused not by the original germs, but by the fusiform bacillus and the spirochetes producing a secondary infection. With reference to the organisms becoming active after measles, O. N. Bryan²⁰ says that a physician told him of a case of measles that had entirely recovered with the exception, when dismissed, of a white patch on the mucous membrane of the mouth, which soon developed into noma.

Other affections²¹ that may precede and help to produce Vincent's angina are dental caries or abundant tartar on the teeth, alveolar abscess, mercurial stomatitis, lymphoid tendencies, enlarged and necrotic tonsils, syphilis, trauma after tonsillectomy, inflamed gums, irritative lesions in the mouth, eruption of a wisdom tooth and of the second teeth in children, and some think adenoids predispose to the disease. Griswold²² describes a case in which the patient cut her wisdom teeth during the attack, and, owing to facial pain, was twice sent to the dentist. The use or abuse of tobacco are said to aid in the development of the disease. Oral uncleanness¹⁸ and bad conditions of the teeth are important causative factors. The organisms¹⁹ are not apt to produce disease unless the teeth, mucous membrane, or tonsils are in an unhealthy condition, or unless the general health is bad. Place²³ believes the disease preventable by proper care of the mouth, teeth, and general health, and says that Vincent's angina should become as unknown as hospital gangrene or typhus fever. G. Hudson-Makuen²⁴ recognizes the danger of infection of the teeth from the tonsils as well as of the tonsils from the teeth, and advises the total extirpation of diseased tonsils.

The first appearance of the disease may be an ulceration on the gums and on the inner side of the cheek. Sutter²¹ describes one case in which the lesion was confined entirely to an ulcerated mucous membrane on a level with the last molar tooth. The pain was that of toothache.

The principal etiologic factors, of course, are the characteristic organisms plus the conditions that harbor them.

PREVALENCE.

Undoubtedly a large number of cases go unrecognized, owing to the fact that the clinical diagnosis is most unreliable, and the further fact that bacteriologic tests have been largely confined to cultures. Often the clinical report is diphtheria, when the Klebs-Loeffler bacillus is entirely absent. As often, perhaps, the laboratory report is negative in cases in which direct smears show the pathogenic organisms.

Some consider the disease rare. According to Rolleston,²⁵ only ninety-five cases, or 0.5 per cent, of 18,187 admitted to the Metropolitan Asylums Board Hospital, London, during 1905-7, as suspected diphtheria, were Vincent's angina. At the Grove Hospital of Contagious Diseases Vincent's was present in only 0.9 per cent of all membranous anginas, and in only 4.9 per cent of the nondiphtheritic cases, while A. Meyer, out of 15,000 cases of ear and throat disease at Heymann's Clinic in Berlin, saw but thirty cases. Vincent has found his angina in only 2.2 per cent of all cases. Many, however, report it as forming a large per cent of all anginas. Rodela found the organisms in 33½ per cent of 2,000 cases of pseudomembranous angina; Beitzke in 8 per cent of fifty-eight cases of suspected diphtheria; Lublowitz in 15 per cent of thirty-eight cases of ulcerative affections of the mouth; Arnold in 60 per cent of a small number of cases of follicular tonsillitis; Chamberlain²⁶ concludes that more than 50 per cent of the throat and mouth ulcers occurring in the Philippines show the fusiform bacilli and the spirochetæ in greater or less numbers, and that 33½ per cent show them in predominating numbers; Koplik²⁷ says Vincent's organisms are always found in gangrenous processes of the mouth among those who are examined in the Mt. Sinai Hospital, in New York; in 1904 Escherich²⁷ proved that in the large hospitals of New York, London, Paris, and Berlin 40 per cent of the diphtheroid diseases were the various anginas, Vincent's no doubt carrying a large proportion of these, though he does not give the per cent; Bluhdorn has found one or the other or both organisms of Vincent in 64 per cent of 222 cases of diphtheria; in 73 per cent of cases of scarlet fever; in 50 per cent of cases of streptococcus or staphylococcus sore throats; in 50 per cent of cases of ulcerative stomatitis; in 67 per cent of thirty-one cases

of syphilitic mouth or throat lesions, and in 58 per cent of forty-three healthy persons.

The usual age of attack is between two and twenty-five years. The greater number of cases appear to be among young adult males and children out of their teens. The disease¹⁹ is common among institutional children and rarer in private practice. The occurrence is more frequent in the spring, early summer, and fall, though not confined to any season. Damp weather has an apparent influence upon the frequency of occurrence.

CONTAGION.

In a number²⁷ of instances the disease has been reported transmissible, the characteristic organisms appearing in those intimately subjected to the contagion. Vincent, Bernard, Auger, Dopfer, Sutter, Green, Chamberlain, Arrowsmith, Holm, and others have reported contagion. It is, however, as stated, dependent upon close contact, such as the common use of eating and drinking vessels, pipes, pencils, etc., or possibly to carelessness in attention to dental or surgical instruments. Chamberlain²⁰ reports a case of hand infection due to a bite by an infected person. Hultgen²⁷ reports a case of hand infection in which a patient with Vincent's angina had the habit of biting his nails. Baron,²⁷ of Dresden, shows contagion in four out of thirty-five cases, and Todd,²⁷ of Minneapolis, reports the case of a pathologist who contracted the disease during an epidemic in an insane asylum. The pathologist harbored the organisms and had severe exacerbations. Several epidemics have been reported, one in which contagion was due to the common use of a tobacco bag, each smoker drawing the strings together with his teeth. Green¹⁸ reports a number of cases with recurrence in one, all due to the matron's feeding the children in a nursery of runabouts with the same spoon. He also mentions the cases of two children with Vincent's angina infecting portions of their own body, and one of a recently admitted child as carrier of the organisms. In this case he ordered all house cleaning stopped except with creolin-soaked mops, after which infection ceased. Holm²⁷ mentions two small epidemics in the State Industrial School at Lansing, Michigan, and one in the Home for the Feeble Minded at Lapeer, Michigan, also four cases occurring the

same day in one of the departments of the State Board of Health, but he does not regard any of them as evidence of contagion, not apparently following each other, but occurring in persons influenced by similar conditions. Fraley²⁸ reports nine cases during quarantine for diphtheria, a common drinking glass supposed to be the medium of infection. It is interesting to note here the comment of Dr. S. McCall Hamill,²⁸ who thinks Fraley's cases not due to direct contagion, but to lowered resistance following the use of antitoxin, Vincent's organisms already existing in the mouth and becoming virulent during lowered resistance. This is a warning note in the use of antitoxin.

Hamill, however, recognizes the contagious character of Vincent's angina, and cites the case of a physician who had a severe attack after an infected child had coughed in his face.

To prevent infection, eating and drinking utensils should be kept separate and sterilized and all mouth discharges burned. The throat, mouth, and teeth should receive special attention following an attack, to prevent infection of others and reinfection of the patient himself.

Fraley and a number of others think the disease should be made reportable.

PATHOLOGY.

Vincent¹⁶ describes two forms of the disease. The first, diphtheroid, characterized by the pseudomembrane, he describes as follows: "The first form resembles diphtheria very much. It begins with a slight pharyngeal pain, and one finds a little whitish spot, at first scant, then thicker, which enlarges and rests upon the red and inflamed mucosa. This membrane may attain one or two centimeters in diameter. The margin is thinner. It is easily removed. It is compact. One sees that it rests upon an ulcerated and bleeding surface. It exists with dysphasia and a slight fetidness of breath. The submaxillary glands are usually swollen. A slight fever accompanies the first appearance of this form of angina. It lasts about eight or nine days. This variety is characterized by the fusiform bacillus alone, or it may be associated with streptococque or staphylococque, etc." Vincent says this form is very rare; that he has seen only two cases in one hundred. The ulceromembranous form he considers more

common and more important. This second form is more intense than the first and more destructive of tissue. In this both the fusiform bacillus and the spirillum are present. The usual point of attack is the tonsil. As a rule it is confined to one side, but it may involve both tonsils, the uvula, soft palate, tongue, gums, mucous surfaces of the cheeks and lips, the sublingual glands, and the larynx or trachea, the last especially in children. Sutter²¹ says in scarlet fever patients he has seen the lesion extend to both pillars of the fauces, the tonsil, the lateral wall of the pharynx, and extend a short distance into the nasopharynx. Place²² reports a case in which the nose was affected with marked caries, and there was a foul odor and a sanguinary discharge. Though the disease may spread widely, extension is not common. It is more apt to be localized in a small area. Bryan²⁰ reports finding the organisms in a specimen from the suppurative condition around one tooth, and in another case of a man who complained of a continuous expectoration of bloody fluid, which flowed from his mouth even at night when he was asleep. This was due to the bleeding, spongy condition of the gums. Dr. Howard Childs Carpenter's²³ experience has been that the lesions usually occur along the margin of the gums, on the inside of the cheeks, and finally on the tonsils. He says that cases in which the infection is on the gums are most resistant, as the organisms find their way under the gums and between the teeth. He has found tincture of iodine applied to the margin of the gums most effective.

Wherry²⁰ divides the types into tonsillar and extratonsillar, each characterized by the specific organisms, but with distinct pathologic influence, the extratonsillar being much less characteristic. In this type there is a superficial ulcer, surrounded by a red, somewhat raised aureola. Unless the tonsil is involved the course of the affection is that of a simple ulcer.

Pathologists give three stages to the progress: the first, congestion; the second, formation of the membrane, from one to several days after the onset, and the third, ulceration, followed, when the prognosis is good, by repair; when it is not so good, by gangrenous processes and rapid destruction of tissue. The progress is, however, not always well defined. The extension of the ulcer is usually lateral. The pseudo-membrane is commonly grayish, but it may be white or have

a yellowish, greenish, or brownish tinge. Green¹⁸ reports in advanced stages "extensive areas of necrotic bone, a black gangrene of the soft tissues, and perforations of the cheeks, lips, and hard palate." Some others report the same, but Dr. Norval H. Pierce,⁵⁴ of Chicago, does not believe that the disease causes perforations of the palate and cheek. Such cases he regards as syphilis, the smears from which may be filled with Vincent's germs. The membrane when removed leaves a surface easily bleeding and tender, the membrane again appearing in the course of a few hours.

The tonsillar form²⁰ is a necrotic ulceration, starting in a crypt, usually behind the anterior pillar, where the drainage is not good. The germ has lodged in a spot where the undischarged secretions form an excellent breeding place. Here infection starts, and nutrition of the surrounding tissues is interfered with. They slough off and leave a foul-smelling cavity. Drainage has been still further cut off and the ulcer is heavily charged with necrotic cell waste. The pseudo-membrane then appears. Wherry²⁰ says that in many cases he has made an incision upon finding the affected crypt and given the patient great relief by the promotion of drainage. He reports the flow of pus small. As soon as drainage is again established the organisms lose their power and the fusiform bacilli rapidly pass away. This, he thinks, proves that the disease is as dependent upon poor drainage and poor nutrition as upon the presence of the germ itself. It also proves, according to Wherry, that the organisms are not very virulent.

The progress²⁰ of the ulcer may be rapid and destructive, and often is. Occasionally, however, marked slowness and little change is noted. O. N. Bryan reports a case in which the patient stated that he had not been free from sore throat for a year, at the beginning of which time he had a peritonsillar abscess.

A membranous stomatitis,¹⁹ especially of the alveolus, accompanies the disease. In severe cases the submaxillary glands are much involved, being greatly swollen, but seldom suppurating. In mild cases they show no change. Attention is called by some observers to the cicatrization which frequently follows healing, although in many cases there remains no visible evidence of attack. Recovery is usually within a few

days, but more persistent cases may last for weeks or even months. Occasionally there is recurrence after several months.

SYMPTOMATOLOGY.

The symptoms are interesting for several reasons. The clinical signs,²⁰ though fairly definite in some cases, are misleading in others. Some writers report an absolute absence of increased temperature, others report a rise³⁰ of from 100° to 108° F., though very few give a temperature above 103° F.; in many cases the constitutional disturbance is slight, in others it is marked; indicated by fever, furred tongue, loss of appetite, and great depression. The depression is common to nearly all cases.

The onset is sudden, beginning, as a rule, with pharyngitis, tonsillitis, or acute stomatitis, followed by the formation of a pseudomembrane. In the start the throat is dry, the tongue coated, the appetite poor and dysphagia is marked. Griswold²² mentions "constipation, sometimes diarrhea, vomiting, pains in the abdomen, chills and fever." Many writers mention the last. The mucous membrane of the gums is often affected and the gums are swollen and bleeding, having much the appearance of scurvy. There is generally pain at the seat of the lesion, often pain and difficulty in mastication and swallowing, enlargement and tenderness of the submaxillary and cervical lymph nodes, salivation, gastrointestinal trouble, facial pain and swelling, sometimes extending down the neck²¹ and to the chest. The symptoms²⁰ ordinarily are much like those of lacunar tonsillitis, but there is less temperature, greater malaise, and more localized pain. The total lack of temperature in many cases is wholly unaccounted for. In this characteristic lack of temperature Vincent's angina differs from every other tonsillar affection.

As a secondary infection the symptoms are more pronounced. E. H. Place quotes Woody, of the Philadelphia Hospital for Contagious Diseases, and Halsted¹⁹ quotes Place, as follows:

"The disease is characterized in secondary cases by little elevation of temperature, but with rapid, feeble pulse, profound prostration, excited nervous system, irritability, wakefulness, tremor, and frequently in later stages with the Hip-

pocratic facies and death in a brief period from toxemia or exhaustion. The odor is characteristic, with salivation and moderate cervical entumescence, and the spongy, friable, and readily bleeding gums are almost invariably present, in some cases simulating scurvy. In severe cases necrosis is very rapid, tissues melting away, destroying large areas in an incredibly short time."

Secondary involvement is reported by Queyrat, Green, and many others.

The ulcers vary in size and depth. The edges³⁰ of the ulcer in the deep variety may resemble the edges of the syphilitic ulcer. It has a base resembling a worm-eaten surface and a punched-out appearance. There is usually an aureola, indicating "stasis of blood."

The membrane is soft and thin and adheres loosely for the first two days. After that the tonsil becomes inflamed and the membrane takes deeper hold, ulceration develops, and tissue destruction begins. The membrane thickens and rises above the surface, increasing still more its adherence, but remaining soft. When removed it leaves an ulcerated cavity beneath, and new membrane immediately forms. The necrotic covering³⁰ is not thick or fibrinous, which characteristics are of value in distinguishing the disease from diphtheria.

As stated, the breath is fetid. The characteristic odor of the disease is mentioned by all observers. The depression is very great, especially where the membrane covers a broad surface and the case is of the severer type. This characteristic is unaccounted for by all writers. It may be due to lowered tension in the nerves from some peculiar influence of the toxin upon the nervous system. There is very marked effect upon the nervous system in the later stages of the severer type. The local pain resembles the pain of quinsy, and at first sight there may be a tendency to diagnose the latter. The cervical glands are usually tender and swollen.

In an attack of ordinary duration,²⁹ the ulcer soon loses its necrotic appearance, and a deep hole exuding pus and cell waste remains. At this point the germ has usually disappeared, but the specific treatment should be continued.

Chills, followed by sweating and headache, with fever may continue for several days before the appearance of the exudate. In scrofulous patients swelling and tenderness of the

lymph nodes may continue indefinitely, but suppuration is infrequent. Some observers report a saffron color¹⁰ associated with severe types. According to Sutter,¹⁰ "infection occurs only when the mucous membrane is abraded, and it often becomes engrafted upon a preceding attack of amygdalitis."

Recurrence is not uncommon. Halsted¹⁹ says it is a marked characteristic of mild cases resembling syphilis, and that a cicatrix or scar in the soft palate or throat is no more presumptive evidence of previous syphilitic diseases than it is of previous Vincent's angina."

BACTERIOLOGY.

The fusiform bacillus is thin and rod-shaped and either bent or straight, with pointed ends and swollen center. It is from 5 to 12 microns long and often not more than a micron wide, though it may be as much as five microns wide. It is reported by Vincent and many others as nonmotile. In certain media, however, motility is very evident. The spirillum is a slender, delicate spiral, varying in length and convolutions; some report from two to twelve turns, coiled or twisted. It is of the same thickness throughout, from two to four microns, as a rule. It may be twice as long as the bacillus. It is motile³¹ and retains motility for some time unless exposed to air or cold. The spirilla sometimes appear singly, sometimes in small groups, and again in considerable mass. Though closely associated with the bacilli, they have no definite arrangement. When one is seen in close contact with a bacillus, its "resemblance³¹ to a bacillus with long, wavy flagellum," as White says, "is striking." The spirilla are found in great numbers on the surface of the ulcers.

The spirillum³² of Vincent must not be confused with the spirochete dentium, which has about five shallow spirals, though some have considered them the same organism; with the treponema pallidum, which has from six to twenty-five spirals; nor with the spirocheta refringens, which has wider turns and greater size.

As Tunncliff, Holm, and others observe, the organisms are polymorphous and present many forms not truly typical. Tunncliff says that spores are often found during the first days of growth, and filaments of various lengths may appear in from twenty-four to forty-eight hours of incubation or later.

Nearly all observers report the two organisms together, but Burlig³³ describes a case of Vincent's angina without spirochetes, and a few others have reported them absent. These cases were probably of the diphtheroid type, which Vincent describes as being characterized only by the bacillus. The spirilla are always present in the deeper form of Vincent's angina. White³¹ says in mild cases other organisms, such as the streptococcus, pneumococcus, and bacillus coli communis, may appear, but that in the deeper forms only the bacilli and spirilla occur. The spirillum is never found alone.

It is not yet certain whether the disease is due to the fusiform bacilli alone, or whether the spirilla have any part in the infection. Some authorities hold that the spirilla lessen tissue resistance and thereby assist the bacilli in their work of infection. Escherich considers the spirilla mere spongers without etiologic influence. Most observers regard the organisms as separate, and some³⁴ have found each as a saprophyte in the human mouth, the bacillus in the tonsillar crypts and the spirillum around the gums and carious teeth.

Many recognize the organisms as distinct and acting in symbiosis, but Tunnicliff³⁵ and many others consider the spirillum the adult form of the bacillus. Vincent vigorously opposes this theory and is supported by a number of other observers. Rhea, of Montreal, says some of his mixed cultures were kept more than a month without producing spirochetes. A statement by Tunnicliff³⁶ is worthy of notice here. She says: "Whether the spirilla formed from the fusiform bacillus [in cultures] are the same as those found in the lesions themselves cannot be decided, on account of the inability to reproduce the lesions in animals." This writer and others have been practically unsuccessful in animal experiments, although such efforts as lowering resistance by injections of bichlorid of mercury, lactic acid, etc., have been employed in the hope of rendering infection easier. Wright and Mackie regard the organisms as but a stage in the life of the trypanosome. Strasser³⁷ calls attention to the opinion held by Wright, that the fusiform bacillus is not a bacillus, but of protozoic origin, his conclusion being based upon its "length, vacuolation, staining properties, and undulatory movements," and to the somewhat inverse opinion of Mackie, that "under certain cultural conditions the trypanosome loses many of its features and becomes similar to Vincent's organisms."

White and Blackwood³⁸ quote Hermann, as follows: "Hermann,³⁹ in summing up the literature on noma, endeavors to simplify the different findings by advancing the theory that the spirillum of Vincent is simply a stage of development of the bacillus fusiformis, and that this latter organism and the streptothrix of Perthes are identical with the spirillum sputigenum and the spirochete dentium which Miller found in mouths as saprophytes. Hermann further states that he considers the spirochete dentium as only a stage of development of the spirillum sputigenum, thus claiming (as previously held by Krahm) that noma is probably caused by the saprophyte spirillum sputigenum, assuming under favorable conditions a parasitic role. He would call this organism the spirochete of necrosis. He still further states that he considers the bacillus necrosis of lower animals to be closely related to this spirochete necrosis."

White and Blackwood³⁸ found a case of noma in a Rhesus Macaque monkey, and upon examination found the pathogenic organisms in the mouths of normal monkeys.

There are numerous ways of demonstrating the fusiform bacillus and the spirillum of Vincent. Carbol-fuchsin and anilin gentian violet are commonly used, and the organisms stain deeply and well with both. With Gram's method the spirilla decolorize and the bacilli decolorize irregularly, and most of them lose the stain. White reports simple basic stains as coloring well. With most stains the reaction for both organisms is about the same. The bacilli do not stain evenly, but appear in stripes, with deeper stain near the ends. The spirilla are more difficult to stain, and appear with less distinctness, but with complete regularity. Holm and others report success with Unna's polychrome methylene blue, and some have used Bismarck brown successfully. There are others, however, who find with Unna's alkaline blue, Loeffler's methylene blue, Bismarck brown, etc., only faintly stained areas of the bacilli, such areas not being definitely outlined and not resembling spores. Staining for spores and flagella, it may be stated, is not successful, which does not support the theory of protozoic origin. E. Baron, however, reports observation of flagellæ. Giemsa's stain and India ink are satisfactory.

Shea²² gives the following method of demonstrating with the India ink process of Hech and Wilenko: "The superficial necrotic area is removed gently, and a small drop of underlying fluid placed on a slide cleansed by means of soap and hot water and wiped off with alcohol. To this add a small drop of India ink (Genther's or Higgins'), and mix thoroughly by means of the platinum loop. With a strip of cigarette paper one-half inch wide smear this over the slide. It dries rapidly. Then place cedar oil directly upon the smear and examine the specimen with the one-half inch oil immersion lens and the one-inch eyepiece. The organisms will appear, together with blood cells, as clear, unstained bodies upon a dark gray background."

The bacilli are usually quite evenly distributed throughout the smear, and are often seen in pairs or end to end, sometimes in tetrads. They present among regular forms many degenerates. The bacilli appear in stains earlier than the spirilla, sustaining Tunncliff's theory that the fusiform bacillus passes through a stage or stages of growth and then becomes the spirillum. This theory seems to be supported also by the fact that the bacilli decrease as the spirilla increase. In earlier processes of the disease they are more abundant than the spirilla, but in later processes the latter are much more abundant.

Cultures are very hard to make. Both the fusiform bacillus and the spirillum are anaerobic. The spirilla appear even in anaerobic conditions only after a long period, the bacilli possibly having to pass through two or three generations. Earlier observers were unable to make cultures at all, because it was not known that anaerobic conditions were necessary and because sufficient time was not given the growth. Nicolot and Marotte succeeded in cultures of fluid media or the water of condensation of solid media, but their cultures were not pure. Silverschmidt uses a one per cent acetic acid bouillon. Cultures on Loeffler's blood serum have been measurably successful. The organisms²³ require such media as blood serum or ascites fluid. Dr. Lawrence Rhea,²³ of the pathologic laboratory, Montreal General Hospital, as quoted by Place, says: "The organisms are anaerobic and grow best upon fresh blood serum, best that of the rabbit, added to one-third or one-half sugar bouillon." Rosenow and Tunncliff⁴⁰

state that the fusiform bacillus grows anaerobically on human, sheep's, or goat's blood agar, and that the last is the best medium, growth occurring after forty-eight hours at 37° C. Tunnicliff³⁶ grew both organisms anaerobically on slants of blood agar by Wright's pyrogallic acid method "by saturating the cotton stopper with a strong solution of pyrogallic acid in a five per cent solution of sodium hydroxid, and closing the tube with a tightly fitting cork and sealing it with paraffin." Her organisms in Vincent's angina were isolated on slants of ascites agar (1:3), those in gingivitis and noma on blood agar. She states that the material was placed on a series of slants, and that as a rule in the second tube the bacilli appeared at the end of three or four days, the temperature being 37° C. After that time spirilla gradually became visible, increasing in numbers and finally constituting the majority of the organisms. Tunnicliff³⁶ found the spirilla most often in a medium of 5 cc. of agar together with twelve drops of equal parts of sheep's or goat's blood and a two per cent solution of sodium citrate in a normal solution of salt. She adds that as the organisms die out rapidly, it is necessary to transplant a large number to get a successful culture. Rhea²³ reports that he has never been able to find the spirochetes living eight or ten hours after the culture was made. He has been able to isolate the organisms in pure culture, growing them for a short time on anaerobic plates. White³¹ obtained results from a one per cent and a .5 per cent acetic acid bouillon and in Dunham's solution, but failed of results from solid media tried at the same time. He reports the bacilli as nonmotile in broth or peptone cultures, and the spirilla as showing slow, progressive movements in hanging drop up to twenty-four hour old cultures. Tunnicliff reports that the organisms show no progressive but considerable vibratory movement, and that the spirilla retain their spiral form. Some observers find both organisms motile in hanging drop.

It is interesting to note that noma,⁴¹ gangrenous stomatitis, and hospital gangrene are as difficult to study by cultures as Vincent's angina.

The great importance of demonstrating the organisms is, of course, to render diagnosis correct and differentiate the disease from diphtheria and other affections which it resembles. The earlier observers had greater difficulty than is now

experienced, because the smears were subjected to a diphtheria test, which is negative as far as Vincent's angina is concerned. Often the case was pronounced diphtheria and antitoxin resorted to, when, in reality, the disease was Vincent's angina. Oftener still, the clinical diagnosis was diphtheria without bacteriologic examination. Holm²⁷ gives an illuminating report, referred to by several later writers, from an examination of two hundred and sixty-five cases. Of these two hundred and sixty-five the clinical diagnosis was diphtheria in ninety-nine. The laboratory report from these ninety-nine cases showed diphtheria in sixty-four. In seventy-three cases showing Vincent's organisms, diphtheria was diagnosed clinically in twenty-eight. Examination of the twenty-eight showed bacillus diphtheriæ present in one, absent in twenty-seven, demonstrating an error of 96.4 per cent in the clinical diagnosis of diphtheria for Vincent's angina.

Of the seventy-three cases, thirty-three were males and forty females; the lowest age was two years, the greatest fifty-five, average eighteen; in all but four cases a membrane was described, involving one tonsil in thirty-one, both tonsils in thirty-eight, extending to adjacent structure in fifteen; in forty-one cases the color of the membrane was grayish, in nine yellow, in eight white, in two grayish yellow, in one grayish green, in two creamy; the highest temperature was $103\frac{3}{5}^{\circ}$ F., the lowest $98\frac{1}{2}^{\circ}$ F., average $100\frac{1}{2}^{\circ}$ F.; the clinical diagnosis was diphtheria, as has been said, in twenty-eight cases, scarlet fever in one, Vincent's angina in five, tonsillitis in seventeen, questionable in twenty. Of the entire seventy-three cases, which may all have been Vincent's angina, only five had been so diagnosed clinically. Again, Holm says that in the two hundred and sixty-five cases diphtheria was diagnosed clinically in ninety-nine, while the laboratory report showed the diphtheria germ present in but sixty-four. The clinical error in diagnosis here, then, is 35.3. He refers to the laboratory of the Massachusetts State Board of Health as demonstrating clinical error of 38.4 per cent in 4,113 cases. This means that more than 1,500 of the 4,113 cases were wrongly diagnosed outside of the laboratory. Holm refers also to error in clinical diagnosis of 29 per cent, or 8,700 cases in 30,000 cases of supposed diphtheria mentioned by Dr. G. S. Graham-Smith. Epler²⁷ says that about one-third of the

cases of virulent diphtheria present a simple angina clinically, the Klebs-Loeffler bacillus being found deep in the lacunar plugs.

Dopter,⁴² in a clear, practical exposition of the bacteriologic analysis of the anginas, with excellent plates of d'angine diphthérique, d'angine streptocoques, d'angine de Vincent, d'angine à meningocoques, d'angine à pneumocoques, and d'angine polymicrobienne, says direct examination is indicated in cases in which the pathogenic germ is not cultivable, and that this is the case with Vincent's angina, though we know, as has been stated, that it is possible to cultivate Vincent's germs under certain anaerobic conditions with a long time given to incubation. He adds that one smear of the putrilaginous substance with the symbiosis of fusospirillaire renders the diagnosis self-imposed.

This writer says that were it not for the fact that Vincent's organisms do not take Gram's method, they might voluntarily be taken for the Klebs-Loeffler bacilli.

Burlig²³ holds that cultures should be used as a control upon direct smears, that a smear will sometimes show only cocci, and therefore diphtheria be ruled out, when cultures upon Loeffler serum would show the presence of the diphtheria bacilli; and, on the other hand, that there are other smears giving evidence of organisms which so closely resemble the diphtheria bacillus that diphtheria would be diagnosed, but cultures would show the absence of the characteristic germ. Cultures may, as Burlig suggests, be a safeguard upon smears, but it is the smear first and last that must be depended upon, and no diagnosis of Vincent's angina can be considered correct without it.

Burrage⁴³ calls attention to a case in which the smears showed Vincent's organisms, together with some staphylococci, and a culture in blood serum showed at the end of twelve hours "many colonies of staphylococcus albus and some of pneumococcus, but none of diphtheria or of the organisms found in the smear." This, we may conclude, was because the media was not that in which Vincent's organisms can be grown—and, I may add, the spirilla will not grow in any culture in twelve hours. In such a case it would be an egregious error to rule out the smear and render diagnosis from the culture alone.

DIAGNOSIS.

As a pseudomembrane in the throat¹⁹ may be caused by the diphtheria bacillus, the streptococcus, the staphylococcus, the pneumococcus, micrococcus catarrhalis, bacillus coli, the fusiform bacillus and spirillum, and two or more are present in nearly every infection, the diagnosis in such cases is necessarily complicated. Vincent's angina may be confused with an ulceration of the gums, a mucous patch, lacunar tonsillitis, syphilis, diphtheria, carcinoma, and other similar affections, and it may be associated with other organisms in lesions which it does not produce.

The etiologic influence of Vincent's organisms is not always clear when they are found in association with other organisms. The rule is that the organism found in preponderating numbers must be held responsible for causation; still caution must be employed, as the organism present in smaller numbers is sometimes proven to be the true causative factor. The mere question of numbers²⁷ is determined largely by the character of the media, which develops more of the organisms to which it is best adapted. In the presence of Vincent's organisms and the diphtheria bacilli, the former may be the pathogenic germs. Holm remarks that Vincent's angina or other membranous affections may occur in diphtheria bacilli carriers, and he cites three cases of Vincent's angina following diphtheria, in one instance at the end of four months, with the diphtheria bacillus still present. Arnold⁴¹ reports a case of septic scarlatina with ulceration of the fauces in which the fusiform bacilli and the spirilla of Vincent were greatly in excess of other organisms, but the regular course of septic scarlatina continued and Vincent's organisms disappeared after two days. He mentions two other cases of scarlatina in which the fusiform bacilli and the spirilla appeared without symptoms in the convalescent stage. He found them also in excessive numbers in follicular tonsillitis. Unlike most observers, Place²³ has seldom seen Vincent's organisms after diphtheria, scarlet fever, etc.

Every care should be used, especially in the diphtheritic type, to exclude diphtheria. It should be remembered that the ulcer is deep and long and does not appear to be spreading from the edges, as in diphtheria, and that the character

of the membrane is different—in diphtheria, thick and tough; in Vincent's angina, light and friable. These signs and the smear should render the diagnosis accurate. Membranous croup and laryngitis must be considered in the differential diagnosis. According to Halsted,¹⁹ many of the fatalities supposed to be the result of membranous croup or pseudodiphtheritic laryngitis in children, when no Klebs-Loeffler bacilli were found, were caused by Vincent's angina attacking the larynx. In the ulceromembranous form the diagnosis may be difficult in the start, but as the symptoms become more accentuated it is easier. Wherry²⁰ says that in the second stage, when the ulcer has broken down, there is no danger of confounding the disease with anything but lues; and when the sudden attack and decided toxic influences are considered, even that is precluded. Vincent¹⁶ grants that the disease is easily confused with syphilis, and states that secondary and tertiary syphilis may be secondarily infected by the fusiform bacilli and the spirilla. He says these organisms have a peculiar affinity for syphilitic ulcers on the pharynx. He acknowledges the difficulty of diagnosis in such a case, but says that the treatment will soon determine which disease is being dealt with in the attack. Salamon reports two cases of Vincent's angina in conjunction with syphilis, the latter appearing after the exudate of the angina had disappeared. Vincent's angina may also become engrafted upon a stomatitis due to mercury.

Place²³ offers the following valuable suggestions for differential diagnosis: That Vincent's angina differs from diphtheria in being always an ulceromembranous process, which diphtheria primarily is not; that it differs from primary syphilis in not being marked by infiltration or any pronounced adenopathy or other signs, and in ready response to local treatment; that it differs from mucous patches in more decided ulceration and distribution, the absence of other signs, evidence in the smear, and absence of Wassermann's reaction; and that the smear, the culture, the progress, the history will all differentiate it from other ulcerations of the mouth.

Arnold⁴¹ does not regard the organisms of Vincent as necessarily pathogenic, because of the fact that they are found in association with other organisms capable of producing the lesion, in cases of diverse clinical appearances, and in cases

known to be very difficult to diagnose. It is unfortunate that inoculation has not proven successful. Nicolet and Marotte had slight results experimenting with a dog, but no inoculation has been followed by satisfactory results. In view, however, of the fact that a great majority of the lesions in which Vincent's organisms are found cannot be shown to be caused by any other factor; that they are the controlling organism in noma, which is an exaggerated Vincent's angina; that they are found in animals with noma; and for other excellent reasons, it appears safe to regard these organisms as genuine and positive causative agents.

One difficulty in diagnosis is the frequent absence of some of the symptoms. Another⁴¹ is variation in symptoms. To sum up, however, the smear, the history of the case, and the treatment will give a diagnosis that in nearly every case may be depended upon.

COMPLICATIONS.

With a true case of Vincent's angina the erythema of scarlatina may appear, pseudorheumatism be troublesome, and albuminuria, myocarditis, and endocarditis be associated. Some²⁰ name herpes, conjunctivitis, urethritis, pleurisy, pneumonia, and noma, and Vincent says that hospital gangrene and gangrene of the lungs may accompany the disease. Young children are more subject to the gangrenous processes, which nearly always terminate fatally. Epler²⁷ names as possible complications "necrosis of the maxilla; destruction of tonsils and adjoining parts, as the uvula; necrosis of the pharynx; nephritis; peripheral neuritis of the lower extremities; swollen joints and axillary nodes; albuminuria; endocarditis; mastoiditis; brain abscess; and peribuccal abscess." A. Baron, of Dresden, found out of one hundred and twenty-three cases of Vincent's angina sixty-seven with ulcerostomatitis and eighty-five with catarrh. Chambers and Willson³⁰ report ulcerative stomatitis as an associated condition in some cases, and state that the ulcerative gingivitis is variable in degree, now and then causing ulceration of the gum edges, similar in appearance to pyorrhea alveolaris, and add that some regard the fusiform bacillus as causing pyorrhea alveolaris. According to Halsted,¹⁹ Vincent's organisms are, at times, the cause of laryngitis, bronchitis, bronchopneumonia, pneumonia, hos-

pital gangrene, abscess of the lungs and spleen, and phagedenic ulcers of the penis and genitalia. Rosenow and Tunnicliff⁴⁰ report what they suppose to be the first recorded case of a fatal general infection due to the fusiform bacillus alone. The patient had appendicitis, following which pyemia, producing multiple abscesses in numerous parts of the body, the result being fatal. Bruce⁴⁴ reports three deaths, two due to suppurative bronchopneumonia after the larynx was involved, and one to toxic absorption from the lesion. Gilberti¹⁹ reports a case of ulceromembranous stomatitis and angina followed by osteomyelitis of the lower jaw, causing death. Mayer describes a case of pernicious anemia with an infection of Vincent's angina, resulting in death, and Halsted¹⁰ reports a similar case. White³¹ mentions one case with appendicitis, and a few cases are mentioned in connection with typhoid fever, but it is not demonstrated that Vincent's organisms in these last named cases were responsible for more than their own characteristic lesions. The prognosis of the diseases they accompanied was, however, affected by them. An exceedingly interesting report is that of Green,¹⁸ in which he says that "cancrum oris is a neglected or aggravated Vincent's angina." This theory has been partially demonstrated by others. Some⁴⁸ have stated that stomatitis gangrenosa, Vincent's angina, and noma may be different stages of the same disease, but Green seems to leave no doubt that noma, at least, is an advanced stage of Vincent's angina. He reports seven cases in nine months that advanced to the stage of noma because the initial lesion was not observed. Four of these recovered. Green thinks that if Vincent's angina is taken in time noma may always be avoided. Corbus and Harris⁴⁶ describe a case of gangrenous balanitis, and state that they regard this form of balanitis as closely allied in bacteriology to noma, Vincent's angina, and mercurial stomatitis, and suggest that the cause of infection is probably the same in all. It is interesting to notice under this head the studies of Chamberlain²⁰ in the Philippines, which relate to the finding of the fusiform bacilli and the spirilla of Vincent in ulcers of the skin and in pulmonary diseases. He calls attention to the fact that Vincent believed *ulcus tropicum* due to his organisms, and that Vincent's observations have been confirmed by Smith and Peil in Sierra Leone, Patten in Aden, and others.

Royer⁴⁷ thinks a broad clinical term should be found to include all lesion caused by the fusiform bacillus and the spirilla, whether on skin surface or mucous membrane, and whether they are membranous, ulcerous, or gangrenous in character, but says that for the present we must be satisfied with the term Vincent's angina for the mucous membrane lesions, and noma for the gangrenous skin lesions. Be the term what it may, the fact remains that these organisms have a wide range of influence, and this renders them a very important study.

TREATMENT.

If the form is tonsillar, treatment should be applied at once to the affected crypt, promoting drainage, keeping the ulcer clean and applying a twelve per cent strength of silver nitrate, which is used by nearly all who have to deal with Vincent's angina. Trichloracetic acid, administered in full strength, has been employed by a good many with great success.

Green¹⁸ describes the application as follows: "I apply it to a freshly cleansed, dry surface to prevent its floating about in the saliva; to avoid extensive cauterization the tissues are painted with melted petroleum or other grease, leaving only the infected area exposed. To lessen the pain of cauterization I drop a few acid crystals into six or eight drops of a four per cent solution of novocain."

He repeats cauterization every two or three days, if needed, and irrigates the mouth with a 0.5 per cent solution of formaldehyd. In case the characteristic odor of the disease is bad, he alternates with irrigations of permanganate. For experiment Green omitted all irrigations in several cases to test the value of the acid, and found that the acid alone effects a cure. Halsted¹⁹ regards trichloracetic acid as best in mild cases simulating syphilis. He uses a ten per cent solution of cocain to anesthetize the ulcer before applying the acid. Iodin, he says, is preferable only in cases in which the ulceration involves a large surface. Shea³² describes a case in which he gave two grains of sodium cacodylate by mouth, then, after removing the membrane, applied tincture of iodine, full strength, during the first two days, a twenty-five per cent solution of silver nitrate on the following two days, and afterward a ten per cent solution daily until the patient was dis-

charged. This case was somewhat aggravated and lasted a month.

When iodine is used the specimen for the smear should be taken from the bottom of the ulcer before the application is made, because the organisms disappear from the surface after iodine is applied, even when they were abundant before the application. Some use chromic acid on the ulcer and peroxid of hydrogen for removing the necrotic material. Place²³ reports that swabbing with hydrogen peroxid, full strength or diluted one-half, until the ulcer is clear and then painting with a two per cent solution of chromic acid once daily, will effect a cure in from two to six days in almost every case. Even when the patient recovers, however, there are discouraging exceptions to ready success in treatment. Bayer⁴⁸ describes a tenacious case beginning in early winter and continuing until May, in spite of the most vigorous and varied treatment, both external and internal. The local treatment included chromic and trichloroacetic acid, recommended as being certain and quick. The patient finally entirely recovered, with no marks of the disease remaining.

Some employ the cautery or excision when necrosis appears. Both are condemned, however, by most writers. After cleansing the ulcer some²¹ use a ten per cent solution of copper sulphate, followed by potassium chlorate or tincture of iodine applied to the ulcer. Potassium chlorate, either locally or internally, is effective, and orthoform in powder or in tablet may be used to give relief from pain. Griswold²² has used subacetate of copper successfully, checking its action by peroxid of hydrogen and giving tonic treatment. Peroxid of hydrogen applied to the lesion he considers most effective because of the anaerobic character of the organisms. Drugs not already named with which writers report success are: Carbolic acid, argyrol, ormorol, zinc sulphocarbolate, potassium iodid, iron and glycerin, lithium salicylate, methylene blue, and salvarsan. Some French writers^{49 50 51} report marvelous cures with salvarsan. One case of a very serious aspect was cured in three days by five applications of salvarsan. Another case which had lasted two months was cured in three days. Other extraordinary cures are reported, some by local use, some by extravenous or extramuscular, but the local use is recommended as best adapted to the general prac-

tice. Anglada and Reveilhe⁴⁹ regard salvarsan as indicated in Vincent's angina more clearly than in almost any other disease.

When associated with diphtheria, diphtheria treatment must, of course, be employed. Holm²⁷ says antitoxin should be used except where the patient is a diphtheria carrier. He mentions two cases in which the fusiform bacillus and the spirilla were associated with Klebs-Loeffer organism. Antitoxin was employed and the membrane promptly disappeared. In another case, however, 5,000 units had no effect. In still another, because of its resemblance to diphtheria, 6,000 were employed, but without effect. As before intimated, care should be employed to avoid ill effects upon Vincent's angina in lowering resistance by the use of antitoxin. Weil³⁴ also sounds a warning note touching the use of mercury where the case resembles syphilis. When syphilis is associated with Vincent's angina, he recommends the curing of the angina before using mercury, as mercury has the effect of increasing and prolonging the angina.

The treatment should, of course, include prophylaxis and attention to the hygiene of the mouth. Halsted¹⁹ says that no progress need be expected until carious teeth and ulcerations around them are attended to. He recommends constitutional treatment, as do a few others.

PROGNOSIS.

As a rule the prognosis is good. The disease is likely to run its course in a few days, but the more obstinate cases may last two or three weeks or longer, and the very serious may run into months. If the case is not seen until an advanced stage, the prognosis is naturally not so good, and when the disease attacks the larynx or trachea, especially in children, the case may be fatal. The mortality of Vincent's angina, on the whole, is not large, but with complications the tendency is to a fatal result, and in this statement are included the severer cases of mixed infection. McKinney⁵² says that in his experience in a virulent type of mixed throat infection a fatal termination is to be expected, and that antitoxin given even in the early stages is not as effective as when employed in pure diphtheria. He quotes Kyle as saying: "The presence of streptococci, in addition to the bacillus diphtheriae,

augurs ill for the patient, because to their effects are due the complications of the more malignant character." Fraley²⁸ and others consider the prognosis most unfavorable when Vincent's angina occurs as secondary to some other infection. Practically all observers regard primary Vincent's angina as having a good prognosis.

CASES.

Rogers, of Philadelphia, reports a fatal case during pregnancy, beginning with severe tonsillitis. Vincent's organisms were abundant. No diphtheria bacilli appeared, but the patient was removed to the diphtheria ward before the laboratory report was received, and there contracted diphtheria. Septic pneumonia developed on the eleventh day. The autopsy showed tonsils, uvula, under surface of the tongue and the lungs affected with gangrene. Klebs-Loeffler bacilli appeared in both lungs. The left lung showed tubercle bacilli. Beginning with virulent Vincent's angina, the case under autopsy showed nephritis, endocarditis, diphtheria, pulmonary tuberculosis, lung gangrene, and swelling of the spleen and liver.

A. Baron, of Dresden, reports a case of Vincent's angina which without the aid of the laboratory would have been diagnosed diphtheria. A girl of fourteen years contracted lacunar tonsillitis, with pain in throat, chills and formation of membrane on right tonsil, but not spreading. No Klebs-Loeffler bacilli, but Vincent's organisms were abundant in pure culture. There was disturbed circulation, irregular heart action, gallop rhythm and dilatation, symptoms of myocarditis, dizziness, and swollen liver. The membrane lasted three weeks. The patient was confined to her bed three months, with pulse one hundred and sixty upon any exertion. Her general health improved, but faucial paralysis developed with inability to swallow or to speak with distinctness. There was difficulty also in moving the arms and limbs. After electrical treatment and baths the patient recovered, with no trace of former complications.

Anglada's⁴⁹ case, cured in three days by the use of salvarsan, was a case of great involvement. The membrane spread widely, almost the entire throat was involved, the submaxillary glands were affected, breathing was difficult, expectora-

tion continuous, and there was fever, rapid pulse, intense functional troubles and bad eruption, with suppuration upon pressure.

Yates⁵³ describes a case of mastoiditis due to Vincent's angina. A girl of twelve years, with a neglected running ear of several months' standing, with swelling over the mastoid region and signs of subperiosteal abscess, was operated upon. A dram and a half of foul-smelling pus was removed. A large part of the cortex was gone, and a dark red, spongy mass filled the space that should have been filled by the cellular bone structure. The dura of the middle fossa was extensively exposed, the lateral sinus uncovered, and part of the posterior bony canal wall was destroyed. The patient later had measles, and the ear trouble increased. A discharging sinus appeared behind the ear and refused to close. North's lactic acid serum was used, however, and after ten days the sinus closed.

Yates considers Vincent's angina as one of the most troublesome and tenacious of diseases. He does not believe it can enter the tympanum, however, except through a preceding affection.

White⁵¹ records a case of typical aggravated Vincent's angina with psoriasis, involving extensor surface of knees and elbows, with slight chest lesions.

Arrowsmith⁵⁴ reports a remarkable case involving the larynx alone. The patient, a man of twenty-six years, appeared for treatment after having suffered with discomfort in the throat with increasing hoarseness and dyspnea for about a week. No trouble was manifest in the thorax, but respiration was difficult. There was no increase of pulse or temperature. The urine bore slight traces of albumin and sugar and a small number of granular and hyalin casts. Owing to pronounced dyspnea, tracheotomy was hurriedly performed. This relieved the trouble so that the patient was discharged in three weeks, but he returned in about two weeks with decided recurrence. Pus had collected in the peritracheal parts, and this foul-smelling matter was discharging from the incision, which had reopened. Small abscesses had formed, and the suppuration was teeming with Vincent's organisms. The sputum was not immediately examined, and it cannot be stated whether the organisms were then attacking the interior of the trachea or

larynx. Dyspnea again necessitated tracheotomy, and both smears from the interior tracheal matter and the sputum from coughing contained numbers of the fusiform bacilli and the spirilla. Blood analysis showed slight anemia, and the urine was not altogether normal. The odor of the tracheal secretion was very offensive and very persistent. For six weeks almost pure cultures of Vincent's organisms were shown from the tracheal secretions, the sputum, and the wound, sometimes with pneumococci, staphylococci, and streptococci. The condition continued unchanged and a thyrotomy was performed. A mass of cheesy exudate filled with bacteria was removed. Beneath this the mucous membrane bled easily and showed erosion to the bare cartilage in places. Both a Wassermann test and syphilitic treatment indicated the absence of syphilis. About a month later the urine was almost entirely suppressed and analysis showed 30 per cent of albumin by bulk, all manner of casts, free blood, and epithelium, renal and vesical. Symptoms of uremic poisoning continued for several days, and the kidney symptoms returned several times later on. About four months after the beginning of the first attack, Vincent's organisms had very nearly disappeared from the tracheal secretions and the sputum. Stenosis of the larynx was produced by cicatricial contraction, and at the time of the report, eight months after the first attack, the patient could breathe comfortably through the larynx only with the tracheal tube open. He could speak, but his tones were not harmonious. Repeated attempts to dilate the larynx with Schroetter's tubes were unsuccessful. Owing to the condition of the kidneys, it was not deemed wise to operate again. No evidence of any lesion due to the specific organisms appeared in the mouth or throat, nor were the adjacent lymphatic glands involved.

Arrowsmith regrets that it is not known whether the infection started in the larynx or trachea or in the peritracheal areolar tissue. He says he has not been able to find in the literature on Vincent's angina that the fusiform bacillus and the spirillum have been found in the discharge from sinuses or abscess cavities.

Rothwell²⁵ reports two cases of his own and one of Dr. Frank J. Hall, a pathologist of Kansas City, Missouri, in which Vincent's angina attacked the bronchial mucous mem-

brane. One of his cases is the following: A lady, while shopping, was taken with a chill. The case was pronounced severe pneumonia. The temperature was 104° F. There was intense pain in the left side, constant coughing, profuse bloody sputum, a sensation of oppression over the upper portion of the chest and of smothering. The breathing and coughing resembled asthma and croup. There was no throat affection and no consolidation of the lung. The tongue was clean. The case was bronchial Vincent's angina, as shown by the smear, teeming with the specific organisms. The character of the trouble remained the same, but gradually grew less severe. For two weeks the temperature varied from normal to 102° F. The patient was up in three weeks, but for two or three months the fluid bloody sputum heavily charged with spirilla was expectorated when she exerted herself in any way.

Royer⁴⁷ reports a case beginning with a pseudomembranous tonsillitis which remained localized for six days preceding labor, when it began to spread rapidly, becoming at the same time gangrenous and very destructive. The pseudomembrane extended within the cheeks "along the buccal mucous membrane from a point opposite the first molar tooth to the angle of the jaw and across the mucous membrane in front of the articulation of the anterior pillar, becoming continuous with the membranous-like material on the tonsil and uvula." There was a strip of the membrane under the tongue on each side, the tonsils were well covered and both sides of the uvula involved. The latter lesions looked like diphtheria, and the patient was given a total of 50,000 units of antitoxin. The other lesions bore no resemblance to diphtheria, and removal of the pseudomembrane revealed a gangrenous process beginning. The patient had been taken to the diphtheria ward, and on the thirteenth day Klebs-Loeffler bacilli appeared, the infection probably having come from the ward. Innumerable fusiform bacilli and spirilla had appeared from the first. The gangrenous processes extended, and all teeth becoming loose, the patient was given chloroform, the curette was used to remove all necrotic surfaces, all teeth were extracted, and the thermocautery was applied to the gangrene on the tongue, cheek, alveoli, tonsil, and uvula. The pseudomembrane reappeared over the cauterized areas and glossitis was evident.

Pulmonary impairment began on the eleventh day, and on the thirteenth day septic pneumonia set in, the patient dying on the seventeenth day. The pathologic diagnosis on autopsy was: Gangrenous stomatitis, gingivitis, uvulitis, and tonsillitis; edema of the lungs, hypostatic congestion, pulmonary tuberculosis with gangrenous area of left lung; lobular pneumonia; dilatation of the right heart; cloudy swelling of the liver and spleen; chronic diffused nephritis, and endometritis."

Bruce,⁴⁴ of London, presents a case of Vincent's angina in the larynx and trachea which is especially interesting in connection with Arrowsmith's case. The patient died in eleven days. The neck was badly involved, the skin and subcutaneous tissues becoming gangrenous and the process spreading rapidly. Bruce regards this as secondary involvement to that in the respiratory tract, and resulting from infection of the laryngotomy wound by discharges from the larynx and trachea.

Murray⁵⁶ describes a chronic case, beginning four months before he was consulted, with membranous patches on the tonsil, and continuing as an irritation. The case began when the patient was nursing typhoid fever.

SUMMARY.

Summing the matter up, Vincent's angina is the local manifestation in the throat and mouth of a disease caused by the fusiform bacillus and the spirillum bearing Vincent's name—probably the same organism in different stages of existence—which may occur in almost any other part of the body and may be membranous, ulcerous, or gangrenous. It frequently occurs after measles, scarlet fever, diphtheria, whooping cough, and numerous other diseases, and as a secondary infection it is serious. As a primary infection it is not usually serious. It is more common in malnourished and in children and adult males. As a primary infection, at least, it is probably preventable by proper care of the mouth, teeth, and general health. It is much more common than is generally supposed, and is frequently responsible for throat and oral infections diagnosed as something else. It is contagious, but transmission depends upon close contact. It is usually acute, but it may be chronic. Recurrence is not uncommon. The point of attack, as a rule, is the tonsil, and it commonly re-

mains localized there, but the infection may spread to cover extensive areas. The progress consists of congestion, formation of the membrane, and ulceration. The ulcer extends laterally. The progress in the severer type may be very rapid and tissue destruction very extensive. The disease commonly lasts but a few days. Occasionally, however, it runs into weeks and months. The symptoms are chiefly local, but may also be constitutional. The absence of fever in many cases, and the marked malaise are, unaccounted for. The organisms are anaerobic and can only be cultivated anaerobically. Proper diagnosis is dependent upon a smear. Differential diagnosis must exclude diphtheria, syphilis, mucous patches, lacunar tonsillitis, carcinoma, membranous croup, etc. Vincent's angina may be complicated with a number of other affections. The treatment is principally local. Trichloroacetic acid, chromic acid and salvarsan seem to have the quickest and best results, but many other medications are effective.

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XXVIII.

A CASE OF CAVERNOUS SINUS THROMBOSIS
COMPLICATING SUPPURATIVE LABY-
RINTHITIS.*

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NEW YORK.

E. C., male, seven years of age, was admitted to Dr. Berens' service, at the Manhattan Eye, Ear and Throat Hospital, on April 17, 1913, with a history of discharge from the right ear for the past five years. Three weeks before, the mother noticed that the child could not close his right eye, and that his mouth was crooked. The day before admission the right eye was closed from swelling of the lids.

On admission the child looked very sick. He was apathetic. His lips and teeth were covered with sordes. His temperature was 100° F., and his pulse 100. In the afternoon the temperature rose to 103° F., pulse 134, respiration 20.

The blood count showed a leucocytosis of 36,400; large mononuclears, 7 per cent; small mononuclears, 4 per cent; polynuclear neutrophiles, 87 per cent; transitional forms, 2 per cent. Blood culture was negative.

The right external auditory canal was filled by an aural polyp. There was a profuse, foul-smelling discharge. There was complete deafness in the right ear, and a negative caloric reaction. The left ear was normal. There was no spontaneous nystagmus.

The right side of the face was paretic, and there was paresis of the right third nerve, resulting in ptosis and divergent strabismus. The eye could move in no direction

*Presented before the Section on Otology of the New York Academy of Medicine, December 12, 1913.

except outwards. There was slight dilatation of the pupil and some edema of the eyelids.

A diagnosis of chronic diffuse suppurative labyrinthitis with thrombosis of the cavernous sinus was made.

A radical mastoid operation was done. Cholesteatoma and granulations were found in the antrum and middle ear. The facial nerve was found exposed and imbedded in granulations, for a distance of three-eighths of an inch, between the external semicircular canal and the oval window. There was a necrotic area over the external semicircular canal. All three semicircular canals were found full of granulations. They were removed and the vestibule opened. This was also found to be full of granulations. The stapes was removed. It came out very easily. The promontory was removed, and the first and second turns of the cochlea were found full of granulations. The lateral sinus and the dura of the middle fossa were exposed and found normal. The patient was put back to bed.

On the next day, April 18th, the temperature rose to 105.4° F., at which point it remained until death. The pulse ranged between 100 and 160, and the respiration between 20 and 40.

The edema of the lids increased, exophthalmos appeared, and the conjunctiva became chemotic. The dilatation of the pupil increased.

On April 19th there appeared slight edema of the lids of the left eye. The eye grounds were normal.

On April 20th exitus, at two o'clock in the afternoon.

Postmortem.—Pus and granulations were found in the right internal auditory meatus. From this point a necrotic tract could be seen leading to the inferior petrosal sinus. This sinus contained a broken-down thrombus, which continued forward into the right cavernous sinus. The clot extended across from the cavernous sinus through the circular sinus to the left cavernous sinus. In the upper wall of the left cavernous sinus there was a small perforation, about one-eighth of an inch in diameter. The pia over the tip of the left temporosphenoidal lobe, which was in contact with this perforation, was covered with exudate. This

patch of exudate was sharply circumscribed in outline. It was one and one-half inches long, and one-half inch wide. On microscopic examination it was seen that this exudate was in the meshes of the pia, and not on its surface, and running through the middle of this patch was a thrombosed pial vein. The pituitary body was necrotic.

The lateral sinus, the remainder of the meninges, and brain were normal.

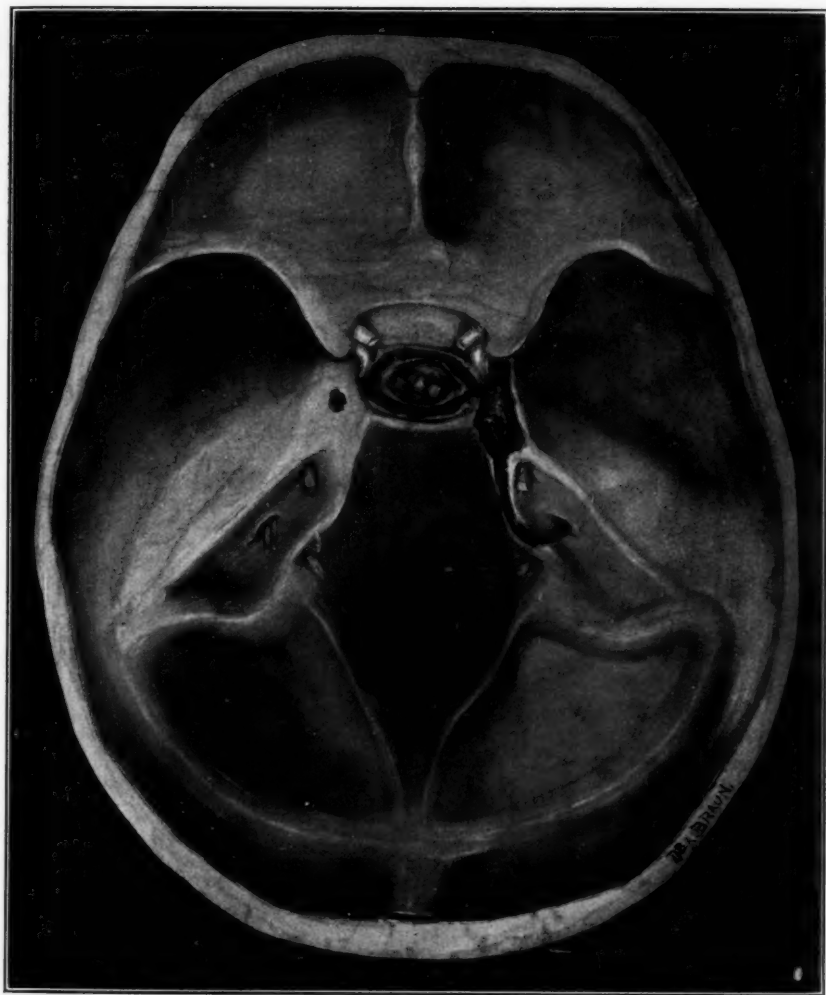


FIGURE 1.

Condition Found at Autopsy.—Pus in right internal auditory canal, clot in right inferior petrosal sinus, both cavernous sinuses and circular sinus.



XXIX.

NASOPHARYNGEAL MYXOSARCOMA: SEVERAL
OPERATIONS AND FINAL SPONTANEOUS
RECOVERY. UNDER OBSERVATION FOR
TWENTY-SEVEN YEARS.*

By E. FLETCHER INGALS, M. D.,

CHICAGO.

In November, 1883, A. P., a boy thirteen years of age, came to me from a distant State complaining of obstruction of the nares and nasopharynx and frequent bleeding, which had been troubling him for three months. There was nothing in the previous history to account for the disease, but twenty-seven years later he told me that a sister had died of cancer. The temperature was 99.5° and the pulse 115. The general condition was good, though he had been coughing for about three weeks. There was loss of nasal resonance in the voice, and I found the right naris filled by a growth which came within half an inch of the nostril, and the septum crowded so far over as to close the left naris; the nasopharynx was also filled by the same growth. The fauces and larynx were normal, also the chest and abdominal organs.

By repeated operations I succeeded in removing practically all of the growth from the naris and nasopharynx, but there was a part which extended behind and somewhat beyond the pterygoid process which could not be removed. A portion of the growth was submitted to Dr. C. E. Webster for microscopic examination, and he reported it to be a small celled myxosarcoma, the malignancy of which would depend upon the softness of the tumor and the rapidity of its growth. He thought this was liable to recur locally, or secondarily in the lungs or liver. As it had grown to this size within about three months, it seemed to be a very unfavorable case. I used the cold snare

*Presented to the American Laryngological Association, May 25. 1914

many times and cauterized with the galvanocautery, and at other times with chromic acid some parts which could not be removed. I inserted into parts of the growth several times a pointed aluminum probe on which chromic acid had been fused; this was left in position about ten minutes until the tendency to bleed disappeared. If the probe were withdrawn at once there would be excessive bleeding. The most interesting of these operations (the seventh and eighth) were made about a month after the patient first came under my observation, and were described in his record at that time as follows:

At various operations with the postnasal snare, using steel wire, with the ends run through catheters passed through the naris and brought out of the mouth, I had removed a considerable part of the nasopharyngeal tumor; and by the snare used through the nostril I had removed nearly all of that part of the tumor that could be secured from the front. I had also used gouge forceps through the naris to remove certain parts of the nasopharyngeal growth; but this caused profuse bleeding. The snare was no longer effective because it could not be made to hold on to any part of the tumor. There remained of the tumor a mass filling one-third of the nasopharyngeal cavity and three-quarters of the posterior part of the right naris. This mass grew from the right side and the posterior and superior surfaces of the nasopharynx, and was also attached to both sides and the roof of the right naris for about 1 cm. forward from the posterior edge of the septum. Below this growth I had secured by the previous operations an opening at the lower part of the posterior naris about one-fourth the size of the choana. There was no part of the growth to which a snare could be applied. In this emergency I improvised from a piece of brass tube a trochar bent to fit the upper and posterior wall of the nasopharynx, through which I passed a sharp pointed copper wire stilette. Passing this trochar through the naris I forced it through the growth at the upper outer angle of the posterior naris and brought it down into the pharynx. Then I passed through it and brought out of the mouth a No. 1 catheter. The trochar was then removed, the catheter being left in position. A similar operation was done on the inner wall of the naris, the catheter being left in position. Another catheter was then passed through the opening below the growth. I now had in position three catheters,

two at the upper angles and one below. Through the upper two I passed the ends of a steel wire, the loop of which was subsequently brought in through the mouth to cut off the base of the growth which was attached to the roof of the nasopharynx. One end of each of two other wires was carried from the mouth through the same catheters, and the other end of both of these through the lower catheter, the loops being brought in through the mouth to cut off the upper, outer and inner attachments of the growth. The ends of each of these wires were secured in snares and they were tightened, but having in some way become crossed, one wire cut one of the others off, and as a result only one side of the growth was completely severed. Subsequently I repeated the operation to cut through the top and inner side of the growth, but all the wires were then carried through the canula of a single *ecraseur*, and as this was tightened both cuts were made completely at the same time. When the piece of tumor thus cut off had been removed, it was found that the nasal cavity and vault of the pharynx had been freed from the tumor, only very small portions remaining at the upper part of the vault and on the right side of the posterior part of the naris.

Soon after this, he went to his home for a few weeks, but returned in December, 1884. He reported that he had been very well and had suffered no more bleeding. He appeared to me about the same as when I last saw him. I found the remnants of the tumor in the nasopharynx slightly increased in size, but the portion in the right naris had grown forward nearly an inch. There was also swelling noticed in the right cheek, which came from a portion of the tumor that might be felt and moved beneath the zygomatic arch. This portion was apparently about an inch in its longest diameters and about half an inch in thickness. It could readily be felt from the mouth just above the level of the upper teeth. The patient's general condition was very good, and he was able to breathe through the nose fairly well. I tried electrolysis on the tumor, placing the negative pole inside of the mouth and the positive pole on the cheek. This was repeated five or six times, but appeared to have very little effect on the size of the tumor. I then injected the growth several times with twenty minims of a three per cent solution of carbolic acid, and continued frequent electrolysis on the nasal portion of the growth.

The galvanocautery was also used frequently to destroy portions of the growth that could not be reached in any other way without causing excessive bleeding, but even with the cautery bleeding was sometimes severe. At one time, when the growth had not been touched for several weeks, severe bleeding occurred during the night.

The patient remained in the city this time until May, 1885, seeing me occasionally, sometimes six or eight weeks intervening between his calls at my office. During this time the late Prof. Gunn attempted to remove the tumor from the right cheek under the zygomatic arch by cutting through the cheek from the angle of the mouth back to the ear, but such severe bleeding occurred that he had to desist and close up the wound without having accomplished his purpose. Then I learned that the boy was running around the city with idle boys and getting into mischief, and I advised his father to take him home. At the time he left the city it is noted that the posterior part of the right naris was about nine-tenths occluded by the growth.

My next note was fourteen years later, March 29, 1899, when it was stated that after going home the tumor grew so that it made the right cheek very prominent and destroyed the vision in the right eye, and for a couple of years he could not breathe at all through the nose.

Afterward it appeared to have gradually atrophied until he could breathe through the nose very well; however, the septum had been crowded so far to the left, where it remained, that it four-fifths occluded that side. Both turbinate bodies on the right side had disappeared and an enormous cavity remained where the tumor had been. At this time the patient was suffering from rheumatic pains which kept him under my observation for about two months.

He called to see me again six years later, complaining only of considerable secretion in the nasopharynx. The tumor had long since completely disappeared, but the deformity of the cheek and the absence of vision in the right eye continued. I saw him again in 1911. He was then in good health, excepting a slight asthmatic condition. The prominence of the right cheek, the bending of the septum to the left, the large cavity in the right naris, and the blindness of the right eye were the same as at the last visits.

HOW THE PATIENT CAN HELP HIMSELF IN CASES
OF CHRONIC CATARRHAL OTITIS MEDIA.*

BY STEPHEN H. LUTZ, M. D.,

BROOKLYN,

This paper is a plea for the better instruction of patients suffering from chronic catarrhal otitis media. They should be instructed and advised in reference to hygiene and diet, methods of ventilation and manner of dress. A careful history of their general condition as well as their ear condition should be obtained. Patients must be impressed with the necessity of giving to the aurist detailed information in regard to their general health. It requires more than a number of visits to the office of the aurist and the after a time more or less perfunctory inflations for patients to obtain the help they are seeking.

Otologists are agreed that diseased conditions of the nasopharynx and nose and the consequent involvement of the eustachian tubes are the cause of ear troubles in a large percentage of cases, but in many cases we must go far away from the upper air passages in seeking for our cause. The other regions of the body must not be forgotten. The proper circulation of healthy blood, the function of the liver and kidneys and a healthy large intestine mean much to the patient in our prognosis. Aneurism, tuberculosis, syphilis, the onset of acute disease, anemia or drug habits must all be remembered. Careful observation and examination and a clear reasoning mind have helped many an aurist over the hurdles that threw his predecessors into the ditches of despair. The otologist who does all his work with a Politzer bag, catheter or other instruments frequently finds his patients missing when he needs them most.

*Read before the meeting of the American Otological Association, May 26, 1914.

Woakes was not so far off in his original writings on the association of ethmoiditis with middle ear disease. At the time it was considered preposterous, but in following years the influence of diseases of the nose and nasopharynx on the middle ear was more plainly shown until Wilhelm Meyer clinched the argument when he published his paper on "Adenoid Vegetations in the Nasopharynx."

Abnormal conditions in the nose or sinuses, with the consequent poor drainage, extension of inflammatory processes from these to the tube mouth, obstruction by the presence of adenoid masses or enlarged posterior ends, or by cicatricial remains due to attempts at removal of adenoids, mucus deposited in the fossa of Rosenmüller, paralyses of, or other interference with the action of, the levator palati and the tensor palati, are all causes of the deafness which we call chronic catarrhal otitis media.

A deviated septum may not always interfere with inspiration or expiration, nor will a diseased accessory sinus of itself directly always cause trouble, but either of these causes will accumulate or retain mucus, and the effort to dislodge the accumulations will almost certainly involve the ear sooner or later. Any blocking in the nose or nasopharynx interferes with the normal action of the tubopalatal muscles, and therefore the ventilation and drainage of the tube is impaired.

Pressure at localized points is a cause of circulatory disturbance, particularly in the venous return from the middle turbinate and eustachian tube, which empty into the veins of the pharynx, and by this imbalance congestion of the tube lining and of the mucous membrane of the drum cavity results, with swelling of the lining and diminished caliber of the tube. Later on, as a result of impaired ventilation and drainage, exudates form and are retained in the tube and in the cavity of the tympanum and also in the area surrounding the tube mouth. This exudation and congestion in the nasopharynx causes the formation of masses of mucus which are hawked backward or blown forward. These acts cause rarification or pressure in the nasopharyngeal cavity; exhausted or rarified air in the nasopharynx allows greater pressure on the drum from without, and imbalance is the result; this difference in air pressure is exerted on the tubes and on their control muscles. The trouble begins at this time from the frequent efforts

to clear the posterior nares. Violent blowing of the nose, the suction and pulling to aspirate the mucus backward, cause the muscles to stretch, recover, stretch again, and this is done repeatedly. Gradually the tube mouth is distorted and becomes a receptacle and retention chamber for infectious laden mucus to further the process already begun.

We have all seen cases in which the effort to dislodge a mass of mucus in order to clear the breathing passage was the beginning of the ear trouble for which the patient sought help.

We know that careful, well done nasal surgery will often stop the progress of the ear involvement by providing a fairly natural open air channel with a fair return of muscular control of ventilation of the tympanic cavity.

In various textbooks we find advice as to methods of clearing the nose. Sprays, douches, blowing the nose with one nostril closed or drawing the mucus back and ejecting it are advised. All of these methods have each and every one had many victims in the past.

Let me beg of you to carefully instruct your patient how to blow the nose. This seems like a simple thing to dwell upon, but it will be found by careful practice to be the best means of helping the patient to help himself and retain whatever improvement he may have gained by treatment.

We can trace almost all of our suppurative cases to one of these methods, because by pressure against the tube mouth, infected material enters the tube and sometimes the tympanic cavity as well.

I instruct the patient to blow gently both nostrils at once into a handkerchief held about an inch away from the nose. The fingers must not compress the nose at any place over the yielding soft parts of the nose, in fact they must not touch the nose at all.

I instruct my patients to place the thumb on one side and the forefinger on the other side, at least an inch away from the side walls of the nose, thus supporting the handkerchief like a bag instead of crumpling it in a wad and pressing firmly up against the nose, as the average person does. When a clear passage of air can be had, stop blowing. There may be some mucus left in the nose, but not enough to block the nose and interfere with ventilation.

Some persons do better holding the handkerchief in two hands, one on either side, resting against the cheeks.

Whatever way is used, do not allow the least pressure on the nose to interfere with both nostrils being cleared at one and the same time. If the mouth can be slightly opened while blowing there cannot be any amount of back pressure toward the eustachian tubes.

XXXI.

TWO CASES OF SARCOMA OF THE DURA MATER
ARISING IN THE VICINITY OF THE MASTOID
PROCESS, WITH VAGUE SYMPTOMS SIMU-
LATING MASTOIDITIS. OPERATION IN
EACH CASE FOLLOWED BY ULTI-
MATE DEATH.*

BY JOHN F. BARNHILL, M. D.,

INDIANAPOLIS.

Mrs. C. F. B., aged thirty-six years, a woman of good build, consulted me at my office June 24, 1912, concerning a pain in the right ear and the right side of the face. She stated that she had suffered some pain in the region of the ear for ten years, and that two years ago the pain was intense in the ear for a short time: that there was then a slight aural discharge which soon ceased, after which the pain was relieved, but that there was still a feeling of soreness and occasional sharp pain deeply situated in the ear, but not behind the ear or over the mastoid. Three or four months ago the pain in the ear and over the face gradually increased and was always worse at night, preventing sleep during the morning hours. The character of the suffering frequently seemed neuralgic, starting in the face and radiating toward and into the ear. She could recall no injury to the face, ear or mastoid region. She had never suffered from dizziness, nausea or general headache.

On objective examination it was observed that the patient was anemic, and looked worn and debilitated from the long continued suffering. Strabismus of the right eye was present, due, it was stated, to a convulsion which took place two years previously. No pupillary disturbance. Slight tenderness over the right side of the face, and on deep pressure over the mastoid. Hearing almost absent in right ear, having been lost, according to the patient, about ten years ago. Bone conduction absent. The appearance of drum membrane was almost normal.

*Read before the meeting of the American Otological Association, May 26, 1914.

Appearance of nostrils quite normal. Good nasal breathing. No evidence of pus in either nostril or of any sinus disease on either side. Pharynx and nasopharynx normal. Tonsils moderately enlarged with deep crypts containing caseous material. The teeth contained many fillings, but none were openly decayed or sensitive. There was no rise in temperature or increase in pulse rate. As a result of this examination I could make out no definite ear disease, but was satisfied that the cause of the pain was not in any of the accessory sinuses. The presence of enlarged and infected tonsils, and of the many fillings in the teeth, suggested, more than any other visible condition, the possibility of origin in these structures. I emptied and disinfected the tonsil pockets and advised that the patient consult a qualified dentist with the view of ascertaining positively whether or not the pain arose in the teeth.

I heard nothing further from the patient until August 1, 1912, when it was stated in a letter that Mrs. B. had continued to suffer without intermission, the former pains being now quite unbearable. She had recently consulted Dr. Albert E. Bulson, a thoroughly competent otologist, who, after careful physical and laboratory tests, had, according to the letter, stated to her that a mastoid abscess was present and that an immediate operation was imperative. I next saw the patient August 6, 1912, at which time there was nothing new worthy of record other than the continued evidence of persistent acute suffering. I was unable after this second examination to determine with any degree of certainty the cause of her trouble, and so stated. It seemed possible that a latent and anomalous mastoiditis was present, but such a diagnosis could be based only on experience with other somewhat similar cases of mastoid anomaly, and not on facts gained from the present examination. The patient had, however, fully resolved to have any operation performed that promised relief, and was even willing to undergo exploratory operative measures. Before undertaking surgical measures I advised a complete medical examination, and Dr. Chas. P. Emerson, accordingly, went thoroughly into the case on the same day. In addition to my own findings, Dr. Emerson ascertained that there was no general cause for the head pain, that there was leucocytosis (14,000), and that there was slight paresis of the seventh nerve. He further states that "some features of the case would lead one

to suspect a central meningeal trouble involving the sheaths of the seventh and fifth nerves and secondarily involving the mastoid." And further in the report adds: "We feel that the mastoid on the right side would better be explored."

August 7, 1912, an exploratory mastoid operation was performed. More extensive incisions than usual were made, and the bone of the mastoid region was widely exposed by reflecting the tissue flaps thus outlined. The bone looked softened and at one point, about an inch posterior to the external meatus, granulation buds were beginning to protrude through to the outer surface. On chiseling away the surrounding osseous structure a large granulating mass was encountered which occupied the entire cellular environment backward, inward and upward. When well uncovered the attachment of this mass was found to be on the dura, over and posterior to the sigmoid sinus, and over the posterior lower portion of the temporosphenoidal lobe. In removing it rather severe hemorrhage resulted, not from the tumor itself, but chiefly from the sigmoid sinus, the wall of which was perforated in the process of separation.

As a result of the operation the patient was greatly but not entirely relieved from the former pain, the wound healed rapidly and closed completely within a month, enabling the patient to return to her home, some considerable distance. Within a few weeks the pain began to increase in severity, strength and mentality gradually failed, and death occurred March 1, 1913, as a result of some "brain trouble." I never saw this patient after October 1, 1912, but it was reported to me that there was no external evidence of the return of the growth.

Laboratory examination of the specimen removed showed endothelial sarcoma.

PATHOLOGIC REPORT.

The pathologic report on specimen removed from case of Mrs. C. F. B. was made by A. C. Shipp, Pathologic Department, Indiana University School of Medicine, as follows:

"The section sent me for diagnosis shows masses of endothelial cells arranged in irregularly shaped concentric whorls about atypically formed blood vessels. The cells vary in shape from that of a typical endothelial cell to almost spindle shape in some whorls, while in others the cells are in appearance and arrangement very similar to the cells of the round celled sar-

coma. There is a slight connective tissue stroma connecting the whorls, and the entire growth is very vascular. The picture as a whole is that of a malignant neoplasm, which for want of a better name we call 'endothelial sarcoma.'

"In explanation of the above, we will say that, according to Mallory, 'An endothelioma is a tumor of mesenchymal origin of which the cells tend to differentiate into flat endothelial cells, and to line vessels, cavities and surfaces.' Of like origin is the sarcoma. The endothelioma, according to Adami, are transitional growths (Adami and McCrea, page 227), and their cells revert readily to the sarcomatous type. The same author gives the following description of the dural endothelioma:

"'Endotheliomas are firm, flattened, or nodular tumors, originating from endothelial cells covering the dura, or possibly from the lining membrane of the vessels of the subdural space. The growth readily implicates the piaarachnoid, and may finally extend to the brain, which it compresses or invades. Irritation of some kind seems to be a potent factor in the causation. We have twice seen, postmortem, cases in which a spur of bone projecting from the inner surface of the parietal bone formed the center about which an endothelioma developed. Occasionally these tumors spring from the outer surface of the dura and erode the calvarium, finally appearing externally. Microscopically they present the appearance of richly branching and anastomosing bands of flattened cells, tending to be spindle shaped, with a characteristic concentric arrangement. It is not infrequent to meet with tumors showing histologic transitions from the endotheliomatous to the sarcomatous type' (See Vol. 1, page 824)."

Case 2.—Sarcoma springing from the dura of the mastoid region. September 5, 1909, I was called to see R. S., of Centuria, Missouri, on account of mastoid disease. I found patient in bed and much prostrated. He was twenty-eight years old, tall, well proportioned and of athletic appearance. He gave a history of pain in the ear and mastoid some weeks previously, the pain having grown steadily worse until surgical means of relief were sought and a simple mastoid operation was performed in the University hospital at Columbia, Missouri. The mastoid wound had never completely healed, the pain continued to grow worse, and weakness of the patient increased to the date of my visit. I found the mastoid wound

dressed and the head bandaged in the usual way. On removal of this dressing a large, soft mass protruded from the mastoid wound which, judged by appearance, was a hernia of the brain. There was much infiltration of the skin and other soft structures around the protruding mass, the adjacent cervical glands were moderately enlarged and tender, and thin pus bathed both the tumor and its environment. The patient had always regarded himself as an exceptionally strong man, had never before been ill, and could recall no injury to the mastoid or ear, which latter had never suppurated. Pulse and temperature were only slightly disturbed, there was no marked headache, and no vomiting or other symptom of intracranial pressure. I secured a specimen of the growth and the laboratory report was that it was undoubted sarcoma.

The patient was brought to the Methodist Hospital, Indianapolis, where I operated September 8, 1909, removing the growth, adjacent bone and soft structures to what appeared to be healthy tissues on all sides. Although removed thus widely there was evidence of return of the tumor with the first repair granulations, and within two weeks the mass was large enough to protrude beyond the skin level. Death took place from meningitis three weeks after the last operation.

The base of the growth was firmly attached to the dura, with which it was so intimately amalgamated that no line of demarkation could be seen. Considerable hemorrhage resulted from the separation of the tumor, but fortunately the sinus was not torn open in the dissection.

In a partial search of recent otologic literature I find only one other very similar case reported, that of Dr. Otto Glogau, of New York. (*ANNALS OF OTOTOLOGY, RHINOLOGY AND LARYNGOLOGY*, June, 1911.) In case one, the history of which was quite complete, there was never any positive evidence previous to the operation which in any way indicated the exact nature of the diseased process. There was not in my opinion any positive evidence of mastoiditis or even of mastoid involvement of any kind. The symptoms were very similar, however, to cases of anomalous mastoiditis I have several times seen and operated, and it was my expectation that this case would be of that type.

I was unable to get a complete history of the second case, but believe from an analysis of the statements by the wife that

the early symptoms pointed more directly to the mastoid, and that it was early diagnosed as mastoiditis without aural discharge.

REPORT OF A CASE OF SINUS THROMBOSIS WITH EXTENSIVE OPERATION ON THE SINUS AND JUGULAR VEIN, IN WHICH SYMPTOMS OF CAVERNOUS SINUS THROMBOSIS LATER DEVELOPED, FOLLOWED BY APPARENT RECOVERY, BUT WITH ULTIMATE DEATH.

I was called to the home of Mr. B., aged fifty-five years, on account of persistent, severe headache, November 10, 1913. The family physician stated that this complaint had been made for several weeks, but that the headache had grown much worse in the past two weeks, and for the past few nights had been so severe as to require the hypodermic use of morphin. He further stated that he found on the most careful examination no good cause for the pain, but suspected that a chronic though slightly discharging ear might be responsible. Patient gave a history of moderately good health all his life. Right ear had discharged for more than forty years, but he had never in any way suffered from it. Had never had any treatment for the ear and did not know the cause of onset. During the past three months has had occasional pains in right side of the head, but only in the past two weeks had he felt the need of the services of a physician. The pain was more severe over the temple than elsewhere, and never centered in or around the ear; was worse at night. The discharge from the ear had never been profuse, and he had scarcely thought of it lately. Had had no vomiting, was not much dizzy, and no falling or whirling sensations. Did not think he had had any chill during present illness. On physical examination patient appeared very ill. Sat erect with difficulty, on account of extreme weakness. Temperature 100°, pulse 95. No paralysis; no stiffness, swelling or soreness of the head or neck. Pupils normal and reacted equally to light. No tenderness to pressure over the head, but slight tenderness to deep pressure over mastoid. The external auditory meatus contained a small amount of partly dried, foul-smelling pus. Drum membrane wanting in posterior superior quadrant. No granulations, no cholesteatoma. These symptoms, taken together with the fact that no general disease could be discovered to account for the present

illness, seemed to justify the diagnosis of chronic mastoiditis with acute exacerbation and probable intracranial complication, and I therefore advised that he be brought to the hospital for a radical mastoid operation. This advice was followed, and the classical radical operation was performed November 11, 1913. The mastoid was eburnated, the mastoid antrum was small, and there were no pneumatic cells in the mastoid process. A small amount of pus was found both in the antrum and tympanum. No necrosis or fistula of the inner table was anywhere found. Following this operation the patient's condition continued same as before, and a few days' careful observation by the nurse showed several occasions when there were chilly sensations but no distinct chill. The temperature chart pointed rather conclusively to infection from some source.

Blood count was made and found to be as follows: white blood count, 23,900; red blood count, 3,800,000; polymorphonuclear leucocytes, 91 per cent; small round celled lymphocytes, 5 per cent; large round celled lymphocytes, 4 per cent.

Never any symptoms of marked intracranial pressure. Still no general disease was found to account for the trouble. At the end of a week the symptoms, while not wholly typical of sinus infection, we believed to originate in that vessel, and a sinus operation was therefore advised and performed. When extensively opened it was found that the sigmoid sinus contained no trace of blood, but was filled with liquid pus into the lateral sinus and almost to the torcular. The bulbar end was therefore filled with a strip of iodoform gauze and the jugular vein was exposed and was found full of pus at the upper end, and contained infected, but not broken down, clots toward the clavicle. The jugular vein was ligated below near the clavicle and above close to its exit from the skull. The branches were followed up and ligated and the intervening vein removed. The bulb end of the sigmoid sinus was then curetted and an iodoform wick was inserted deeply toward the bulb. The bulb itself was not uncovered or curetted. The neck wound was completely closed except for the exit of a large cigarette drain. The mastoid and sinus wounds were packed and left widely open. The patient's condition at the end of the operation, while not critical, was not good.

Following this operation the pain was lessened, and the temperature curve followed the normal line very closely for

about one week, after which it again became somewhat irregular, but did not rise above 100° until the tenth day. From the twentieth to the thirtieth day there was again septic temperature. The appetite was never satisfactory, sleep was sometimes impossible, and there was occasionally a sort of muttering delirium lasting only for short periods. Patient sat up at the end of ten days and desired much to return to his home. At this period there appeared, with great suddenness, a swelling and protrusion of the right eye. (Figure 1.) Separation of the lids revealed no inflammation of the eye, and vision was normal. Eye grounds were not examined. All symptoms pointed to thrombosis of the cavernous sinus, and although the progress of the case had seemed favorable till now, the appearance of this new complication gave cause for an unfavorable prognosis. On this account, and on account of the earnest pleading of the patient to go home, he was allowed to do so, accompanied by the same nurse who had been in constant attendance. At this time the wound in the neck was completely healed and the mastoid and sinus wounds were nearly dry, healthy in appearance and almost closed. I saw the patient no more, but received frequent letters from the attending physician, stating that the progress of the case had become favorable, the temperature gradually returning to normal, the protruding swollen right eye having returned almost to normal at the end of a month, and that the strength and general well being of the patient were apparent. On January 15, 1914, recovery was so far advanced that the nurse was dismissed. The patient was then able to sit at table with the family at meal time, and on nice days had walked some in his farm yard. Death occurred suddenly on February 24th at this time of expectant recovery, the cause probably being a large embolism. No postmortem was made, consequently neither the exact cause of death nor the state of the obliterated sinuses could be known, but it was believed by all who saw and studied this case that all the larger cranial sinuses on the right side of the head were at one time blocked from the general circulation.

The chief lesson in this is found in the fact that a running ear may continue a very long time without apparent harm, but that suppuration, though slow, is almost certain in all cases to end in disaster to the patient.



FIGURE I.



XXXII.

A CASE OF LATENT MASTOIDITIS COMPLICATED
BY TOXIC AND IRRITATIVE CEREBRAL SYM-
TOMS, ACCOMPANIED BY BLINDNESS AND
A STREPTOCOCCEMIA CAUSED BY
TRAUMA—OPERATION—RECOVERY.*

BY SAMUEL KOPETZKY, M. D.,

NEW YORK.

F. D., aged twenty-seven years, is married; has two living children, and never had any serious operation except for an otitis acuta on the left side, a year or so previous to the beginning of this history. Her personal and family history is negative.

Her illness originated in a slight blow over the left supraorbital region, three weeks before her admission to the New York Red Cross Hospital, on June 3, 1913.

The trauma was slight, and for two days afterwards she appeared and felt normal. Then edema showed itself over the injured area, although no skin had been broken, and she began to run a low temperature, ranging about 100°. Headaches began at this time.

Three days later the edema spread to the opposite side and began to clear away. Her body at this time was covered with an urticarial rash. Dr. David J. Hyman was in charge of the case, and he called in Dr. Frank Van Fleet to examine the eyes.

The eye grounds were found normal at this time, and I was called in to see the patient, to determine whether or not the frontal sinuses were involved. These were found normal. The patient continued to run a temperature, and the intensity of the headaches increased. On May 31st I saw her again; the edema over the right eye, and also

*Presented before the Section on Otology of the New York Academy of Medicine, December 12, 1913.

over the other eye, had entirely subsided, but the headaches were more intense. Previous to this Dr. Abram Jacobi had seen the case. On June 1st delirium appeared. The delirium would alternate between periods of excitement and depression. She was subject to moaning, then crying out violently, with periods of excited and irrational talk. She also began to complain of not seeing well. On admission to the hospital, examination, undertaken by Drs. Israel Strauss, Hyman and myself, brought out the following facts, which were later again demonstrated to Dr. Elsborg when he was called in consultation:

EXAMINATION.

Small erythematous, punctate rash on outer surface of both right and left thighs. Vasomotor irritability of skin not marked. Heart and lungs negative. Spleen not palpable. No rigidity of neck. No Kernig. No loss of power in hands or legs. No ataxia of upper extremities. No paralysis of muscle.

Eye grounds.—Right eye, veins somewhat engorged. Disc somewhat swollen, evidence of optic neuritis present. Left eye, condition similar to the other, but less pronounced. Conjunctiva injected and slight ptosis in eyelid.

Reflexes.—Both abdominal reflexes were absent. Knee jerks: right, present; left, more active than right. Achilles present, more active on the left side. Plantar reflexes more active on the left side. Ankle clonus absent right side. Babinski present on the right side; absent on the left. No Oppenheimer reflex on either side.

Blood pressure 100 mm.

Sensorium.—Confused. Patient answered questions correctly when spoken to and aroused. At the time of examination she appeared exalted. She could distinguish coins. In reading, she read a few words; repeated them and then added sentences brought out by the association of thought in the subject matter she was reading. In repeating what was read, she elaborated her sentences. (Writing specimens submitted.)

When given a sentence to write, she elaborated but did not finish the idea she attempted to write.

Ears showed nothing of moment. No discharge.

Lumbar puncture showed cerebrospinal fluid under increased pressure. The fluid was clear, reduced copper, but contained a moderate amount of lactic acid. No bacterial growth.

Her blood culture, taken at this time, as reported by Dr. Pease, showed a streptococcus mucosus.

The Wassermann was negative.

A streptococcic vaccine, prepared by Prof. Elser of Cornell, was subsequently administered intravenously by Dr. Strauss during the course of the after-treatment.

X-ray plates of the frontal sinuses, the ears and the head, generally, were attempted, but were not successfully carried out, on account of the difficulty of having a bed-ridden patient lie quiet. Gradually she could only see light, blindness was partial.

On account of the mental symptoms presented it was determined to do an exploration of frontal lobe, and this was carried out by Dr. Elsberg. No abscess was found, although several punctures were made, thoroughly searching the lobe.

The dura, the muscles and the skin were sutured and a bandage applied. She recovered from this operation, but the mental symptoms continued, and for a few days after the operation she ran a temperature between 103° and 104°, going as high as 104 4/5° the third day. The pulse, during this high temperature, remained relatively low; namely, from 88 to 104.

A second blood culture again showed a positive growth of the same organism. A third blood culture, taken after the fourth injection of the vaccine, was sterile, but by that time the other symptoms had subsided.

The dressing of the wound in the left temple was left in my care, and on removing the bandage on the fourth day a discharge of pus was found coming from the left ear. The mentality meanwhile was clearing. The smear and culture of this discharge showed a similar organism to that found in the blood.

The patient during her rational moments complained of pain in this ear, although examination did not reveal any of the classical signs of mastoiditis. But on June 19th the radical mastoid operation was undertaken, with a view

to exploring its condition and exploring the temporo-sphenoidal lobe.

This operation was performed by me. The mastoid process was found eburnized and contained no gross evidence of pus. The tegmen was found intact. I opened the tegmen and found normal dura. The temporosphenoidal lobe was then searched in the usual manner, but no abscess was found.

Patient came out of the anesthetic, gradually became conscious and the mental symptoms slowly disappeared. She was discharged on July 1st, and subsequently returned for the usual postoperative dressings. The rest of her recovery was uneventful.

During the entire course of her sickness, in addition to the injection of the vaccine, she received medication consisting of various nerve sedatives and urotropin, in five-grain doses, every two hours during the entire twenty-four hours.

The case is interesting because of:

1. The insignificant incident which started the train of symptoms.
2. The symptom of brain abscess. The interference with the association fibres, causing suspicion of an abscess in the frontal lobe; then, later, in the silent area of the temporosphenoidal lobe.
3. Positive blood culture—*streptococcus mucosus*.
4. The blindness, with ptosis on left side.
5. The late involvement of the middle ear.
6. The remarkable recovery from all symptoms.

XXXIII.

(1.)

SINUS OPERATION; RESECTION OF INTERNAL JUGULAR VEIN; PNEUMONIA. METASTATIC ABSCESES IN ANKLE JOINTS. RECOVERY.*

(2.)

SINUS OPERATION; LIGATION OF INTERNAL JUGULAR VEIN; SHOCK DURING OPERATION; PROLONGED CONVALESCENCE.*

BY M. D. LEDERMAN, M. D.,

NEW YORK.

(1.) This little girl is a rather healthy looking specimen to present after the serious experience through which she has passed. At the very onset of her search for surgical relief, complications arose. While on her way to Lebanon Hospital, in an ambulance, there was a collision with another vehicle and she was thrown into the street, but fortunately was not seriously injured. She was brought into the hospital for acute mastoiditis, complicated by sinus thrombosis and jugular involvement, following a suppurative otitis media. A brief recital of the case will show how much a sturdy child can endure and yet survive.

On the 10th of March, 1913, Goldie G. was admitted to the hospital. She had previously been treated at home, where the ear drum had been twice incised by the family physician. She was subsequently treated by continual douching, until the disease showed further extension, when the doctor referred the case to the hospital. Earlier on the same day she had been taken to a prominent special hospital, where the ear was examined and the report was made that the condition was not sufficiently important to

*Presented before the Section on Otology of the New York Academy of Medicine, December 12, 1913.

keep the child in the hospital. When seen by me on the second day after admission, there was some tenderness over the antrum, bulging of the drum, and retarded drainage.

A liberal incision was made through the drum, with the usual irrigation after-treatment, but the mastoid symptoms progressed. Two days later the child was again operated upon, the sinus being explored on account of the septic temperature (as it fluctuated from 98° to 106.4°). A parietal clot was removed, followed by some bleeding from the bulb and free bleeding from the upper portion of the sinus. As the temperature still persisted, the child was given antistreptococcus vaccine, but without the desired effect. Three days after the previous operation the conditions indicated jugular involvement. The child had a decided chill, with typical septic temperature, reaching 106.4° , and sweating. There was distinct tenderness along the outer border of the sternomastoid muscle. Ligation and resection of the internal jugular vein were clearly indicated.

As she was brought to the operating room (March 17, 1913) the little one had a severe chill and was quite cyanosed. An examination of the chest showed involvement of the right lower lobe, posteriorly. Under existing circumstances it was deemed hazardous to administer an anesthetic, so the patient was returned to the ward and palliative treatment given. As the septic manifestations continued—another chill, high temperature and sweating—it was thought that the little one would succumb to the progressive infection unless the same was checked. On the following day I resected over two inches of the internal jugular vein, though the physical signs of the chest showed the presence of a pneumonia at the right side, posteriorly. The first ligature was applied as near the clavicle as possible; the second one above the facial vein. The other venous branches were ligated and a gauze pad was introduced beneath the jugular vein to protect the underlying tissue before resecting it. In cutting through the vessel a white clot was observed, filling its lumen. My impression at the time was that the clot extended beyond the lower ligature, but in order to get below this point the clavicle

would have had to be resected. After this intervention no further chill was recorded. The temperature assumed a more regular type, remaining around 104° to 105° for five days. Up to this time two doses of streptococcic vaccine were given hypodermically. As the pneumonic infection improved the fever gradually subsided for a few days, when it suddenly jumped to nearly 105° seven days after the jugular resection. Pain and temperature, with swelling in the region of both ankle joints, were noted. As the mastoid and neck wounds were doing nicely, we felt that the rise in temperature was due to metastasis. Wet dressings were applied, but the parts remained exceedingly painful, every movement of the feet causing the little one to cry out with pain.

Finding that the temperature had resumed its septic character, with fluctuations from 100° to 104° , Dr. A. Hyman, of the surgical division, incised both ankles. A considerable quantity of pus was evacuated, but the joints themselves were not involved. The bacteriologic examination of the pus showed streptococcus infection.

Improvement in the symptoms continued for six days, when another abscess of the left foot was opened. The temperature, at this period, was fluctuating between 100° and 103° . Another dose of streptococcus vaccine was injected. No further complications appeared until April 20th, when the patient complained of severe pain in the right thigh. The temperature at this time touched 103° . We anticipated another metastatic abscess, but, fortunately, the tenderness at this site disappeared under the wet dressings. In two days the fever dropped below 101° , and remained so until May 1st, when it touched 102° , after being around the normal mark for three days. Another collection of pus was found in the left foot and was incised.

On May 10th the young lady was discharged from the hospital. The mastoid and neck wounds had healed kindly quite some time before, but the ankle abscesses required further attention. The parents were anxious to have their daughter at home, so permission to leave was granted. Dr. Klein continued the necessary treatment at home, and the little one was confined to her room for fully a month

longer. During that period the temperature went as high as 105°. After she was able to get out of bed, it was two or three weeks before she was able to walk properly. To see her at present, none would suppose that she had passed through such a serious and painful experience.

The differential blood count always showed good resistance, which corresponded with the ultimate clinical result. Though a number of blood cultures were taken the reports were all negative. Unfortunately, the section of vein which was removed, together with the thrombus, was placed in alcohol, and so transported to the pathologic laboratory. Consequently, no culture was obtainable.

One of the interesting features in this unusual case is the clinical fact that a rather lengthy operation was performed, without untoward results, in the presence of an existing pneumonia. Urotropin in ten grain doses, well diluted in water, was given every two hours for over two weeks. When symptoms of vesical irritation appeared the intervals of administration were lengthened, but the drug caused no other unpleasantness. What definite effect this medication exerted upon the septic process can only be judged empirically. It was surprising that the dosage given caused so little disturbance. During the continuance of the disease the child was taking alcohol in the form of eggnogg, six ounces every two or three hours, alternating with two drams of whiskey. Later on strychnin and tincture of ferric chlorid were given. At no time did the urine show any kidney involvement.

(2.) The second case is that of a little girl, six years of age, who was admitted to my service at Lebanon Hospital, on February 7, 1913, with symptoms of mastoid involvement, following an acute suppurative otitis media (right ear) of one week's duration, secondary to a coryza. The drum had ruptured spontaneously twenty-four hours after the onset of pain in the ear, which was accompanied by fever and chilly sensations. The child was fretful and apathetic, and the conditions prompted the parents to bring her to the hospital for treatment.

The child had had measles, followed by whooping cough, a year or so previous to admission. There was also a previous history of jaundice, with several attacks of epis-

taxis. The right ear showed a bloody purulent discharge, with tenderness and redness of the mastoid process. The temperature was 100.6°; pulse, 106; respiration, 26. Physical examination showed the liver to be enlarged and palpable below the costal margin.

On the following day, February 8, 1913, the usual mastoid operation was performed. Considerable disease of the bone was found, together with unhealthy granulation tissue. Pus was present in the cells of the antrum and tip. The sinus was uncovered, but macroscopically did not appear to be diseased, so no further exploration was attempted. Three days later the temperature gradually reached 101°, then suddenly jumped to 104° in four hours, with two remissions to 102°. During the morning hours of the fourth day the fever dropped to 99.2°, followed by a chill, and the temperature then climbed to 105° in the course of the next twelve hours. That same afternoon I explored the lateral sinus, and, although but a slight change was noticed in the color of the vessel wall, a thrombus was found extending toward the lower end of the sinus. This obstruction was removed, followed by free bleeding from the bulb and from the upper portion of the vessel. As no local symptoms were observed at this time along the course of the jugular vein or in the neck, no further intervention seemed to be indicated. Consequently, no attempt was made to ligate or resect the vein, as we felt that the cause of the continued sepsis had been removed.

Following this procedure the temperature dropped to 102° in eight hours, where it remained for twelve hours without fluctuations. At this time a blood specimen was taken, which remained sterile after fifty hours of observation. Dr. Fridenberg examined the child's eyes on February 14, 1913, and found both discs decidedly pale, soggy, and somewhat prominent. The outlines were obscured, veins very tortuous, and the entire retina was markedly hyperemic, with two small capillary hemorrhages.

The patient was very restless, cried constantly, and was awake the greater part of the previous night. As her general condition was growing worse, though the temperature curve showed no distinct fluctuation, and no chill

was recorded after the exploration of the sinus, it was thought best to ligate the jugular vein to obviate, if possible, any further extension of the infection. The result of the eye examination prompted this conclusion, without delaying for further definite indications. It was impossible to differentiate acute local tenderness along the course of the vein, on account of the child's restlessness and irritability. During the afternoon of the 15th the temperature reached 103.2° , and about ten o'clock that night we attempted to ligate and resect a portion of the vein. After some difficulty the vein was found. It was collapsed and very small, and during the attempt to separate it from the vagus and carotid artery the patient stopped breathing; and it was only after several anxious minutes of artificial respiration and hypodermic medication that breathing and circulation were restored.

Under the circumstances no effort was made to resect the vein. Two ligatures were applied—one near the clavicle, and the other higher up. The presenting tributaries were tied off, and the wound was closed as rapidly as possible, a small drain being placed in its lower angle. The patient was removed from the operating room in an unfavorable condition. Following the jugular ligation the child had a very restless night, and was uncomfortable for twenty-four hours, though the temperature gradually came down. She received liquid nutrition every three hours, in the form of whiskey, milk and eggnogg. Urotropin was also given, every two to four hours, as a prophylactic measure, for about three weeks, without any discomfort.

The neck wound became infected—probably from the sloughing portion of the jugular vein—and had to be packed in the usual manner until healed. No further complications appeared, with the exception of an acute inflammation of the auricle on the opposite side, which took on an erysipeloid appearance; but this soon subsided under ichthyol and boric acid dressings. This condition was due to traumatism, as the little one frequently scratched her ear, though no suppuration of this side was seen at any time.

She was able to be out of bed on March 19th, and was

discharged from the hospital on April 20, 1913, two and a half months after admission.

The seeming torticollis which exists is not due to any contraction of the sternomastoid muscle, nor to any adhesions of the scar and neighboring tissue. She can rotate her head when her shoulders are steadied, and, under orthopedic instruction, this unpleasant sequela is improving nicely. It probably resulted from the fact that the child always kept her head to the opposite side and feared to change her position on account of pain during and after the dressing.

This case shows that we may anticipate a favorable termination of a jugular infection by a simple ligation of the vein without prolonging the surgical technic incident to its removal. I am inclined to believe that the handling of the vagus in this case accounted for the unpleasant experience encountered.

Good hearing has remained in both the cases presented, and I feel that the results in both children are very fortunate.

XXXIV.

FURTHER REMARKS ON THE USE OF NITRATE OF
SILVER APPLIED WITHIN THE MOUTH OF
THE EUSTACHIAN TUBE FOR THE
RELIEF OF TINNITUS.*

By WILLIAM C. BRAISLIN, M. D.,

BROOKLYN.

The following notes aim to elaborate certain points of a paper read before this society two years ago on the use of silver nitrate applied within the eustachian tube for the relief of tinnitus, especially as to technic and results.

TECHNIC.

Though medicaments have been applied to the interior of the tube by the syringe, bougies and other methods, the manner of application found by the writer to be the simplest and most generally useful is by a cotton tipped wire. The wire employed is composed of two thin silver strands twisted firmly into one. This wire gives the proper strength, resilience and elasticity needed for the purpose, and was suggested, I believe, by Dr. Sidney Yankauer, and made by Tiemann.

The small bit of cotton for carrying the medication is wound on one end of the wire firmly and smoothly. In winding on, the bit of cotton is laid against the wire, and the wire is then rolled toward the right, as in driving a screw. The wire is likewise rolled in the same direction when within the eustachian tube if this is found necessary to facilitate its passage, and for surmounting folds or ridges of mucous membrane within the tube, when present. The size of the cotton pledget wound on the end of the wire is rarely more than double the diameter of the wire; but in marked swelling at and about the mouth of the eustachian tube, larger pledgets are used for application within the trumpet-like expansion of the tube only. The

*Read before the meeting of the American Otological Association, May 26, 1914.

deeper applications of the small sized pledgets are reserved for subsequent applications. The fibers of cotton projecting beyond the end of the wire are bent over to mark the end of the wire, and are then trimmed off smoothly with scissors in order to prevent the projecting fibers, unsupported by the wire, from doubling within the tube. The cotton pledget is then tested to see that it cannot be pulled off the wire, but is not dipped into the solution until after inflation of the tube, just before the wire is introduced into the catheter.

The strength of silver nitrate solution employed is usually twenty grains to the ounce (four per centum), though a strength of eighty grains to the ounce has been used when the application is not to be repeated within a week or longer.

REMOVAL OF PLEDGET AFTER USE.

If the wisp of cotton is moulded on the wire as firmly as it should be, it cannot be pulled off, and is only with difficulty trimmed off with scissors curved on the flat. It is most easily removed from the wire by burning in the alcohol flame.

Under this treatment the wires may become bent or brittle. Bends and angles are readily removed by passing the length of the wire held at a slight tension slowly through the flame. As soon as a wire shows signs of becoming brittle, it is discarded.

RESULTS.

I need hardly say that we may expect to obtain no relief from tinnitus due to lesions of the auditory nerve or of the central nervous system by this method. Congestion and swelling of the tubal mucous membrane, so generally accompanied by tinnitus, seem to me to be more rapidly relieved when, in addition to the other generally employed measures, local applications of silver are made. Operative measures increasing the patency of the posterior part of the nose sometimes alone give prompt and permanent relief of tinnitus, especially the removal of spurs causing pressure on the opposed turbinates.

Digestive, circulatory and general diseases, if present, are factors which nearly always play a part in producing or aggravating tinnitus; yet the middle ear disease once started, no matter by whatever agency, requires, as a rule, active, even vigorous treatment directed toward restoring the normal patency of the eustachian tube.

XXXV.

TEMPOROSPHEOIDAL ABSCESS SECONDARY TO
CHRONIC SUPPURATIVE OTITIS MEDIA—OPER-
ATION—RECOVERY—RADIOGRAPHIC
FINDINGS.*

By J. M. INGERSOLL, A. M., M. D.,

CLEVELAND.

The patient was a boy, fourteen years old. He had had a chronic suppuration in the left ear for three years. On November 20, 1913, he was brought to Lakeside Hospital. His mother said that six days before he had fallen to the floor unconscious and had remained so for several hours. After that he had had repeated attacks of vomiting and had complained of severe headache and some dizziness. He was examined by me soon after admittance to the hospital. There was a foul purulent discharge from the left ear, and the posterior canal wall was prolapsed; no nystagmus, no strabismus, pupils equal and reacting normally, eye grounds normal. He was very restless and irritable, and his cerebation was sluggish. His temperature was 97.4° and pulse 65. The hearing in the right ear was normal, and in the left ear it was fifteen one-hundredths. Lumbar puncture and blood count were negative.

A stereoscopic radiograph showed a cholesteatoma filling the antrum and extending backward and downward over the sigmoid sinus. The two vertical semicircular canals showed very distinctly. The symptoms, of course, suggested a brain abscess, but we were unable to locate it in the radiograph at this time.

A radical mastoid was done, the cholesteatoma was removed, and as the sigmoid sinus had been exposed over an area about two centimeters long and one centimeter wide, by pressure necrosis from the cholesteatoma, it was thought that perhaps this was enough to account for the symptoms of brain irritation.

*Read before the meeting of the American Otological Association, May 26, 1914.

For three days following the operation the pulse and temperature were normal, and the brain symptoms improved. On the fourth day the temperature was 102° , pulse 110, there was a paralysis of the left external rectus muscle, ptosis of the right upper lid, and a beginning optic neuritis. The patient was much more irritable and complained constantly of severe headache. At times he was partially unconscious.

On account of these symptoms a second operation was done immediately. The mastoid incision was opened, the dura exposed over the antrum and incised, and a brain knife inserted upward and slightly backward for three centimeters. About two ounces of foul, thick pus were evacuated, and the cavity was lightly packed with iodoform gauze.

After the second operation the patient began to improve. The first dressing was done on the fourth day, and from this time on the recovery was uneventful.

The hearing now (February 16, 1914) in the left ear is twenty-two one-hundredths. The paralysis of the external rectus muscle has almost entirely disappeared, there is no ptosis of the lid, and the eye grounds are normal.

One week after the brain abscess had been operated upon a second stereoscopic radiograph was made, while the gauze packing still extended up into the abscess cavity. This was done in order that we might locate definitely the abscess cavity in the radiograph and then study the first radiograph. With the aid of the second radiograph a more careful study of the first one shows a darkened area in the region where we now know the abscess cavity was located. This dark area begins over the roof of the middle ear and the antrum, and extends upward into the brain, ending in three finger-like projections. We feel very confident that this shadow was caused by the brain abscess, and that our failure to recognize it before the first operation was due to our lack of experience in interpreting the radiographs of a brain abscess.

We believe that we will be able to recognize and outline fairly accurately brain abscesses as we gain experience in the interpretation of stereoscopic radiographs of the mastoid.

DIFFUSE SEROUS LABYRINTHITIS COMPLICATING ACUTE PURULENT OTITIS MEDIA.*

BY ERNST DANZIGER, M. D.,

NEW YORK.

The lines of indication for operation in diffuse labyrinthitis complicating chronic otorrhea are at present clearly drawn, and we all realize that a diffuse labyrinthitis followed by complete loss of function carries with it the imminent danger of purulent meningitis or abscess in the posterior fossa. No one will hesitate under such conditions to drain the labyrinth and, if necessary, the subdural spaces.

It is different in cases of diffuse labyrinthitis complicating acute middle ear suppurations.

The Vienna school advocates the labyrinth operation when there is complete loss of function. It is on that account that I report three cases of this type which have recovered without operation, with complete loss of function of the cochlear apparatus, but with good compensation of equilibrium. In my opinion, we have to differentiate between labyrinthitis as a very early complication, within a day or two of the onset of the acute otitis, without temperature or meningeal irritation, and labyrinthitis occurring after some weeks, together with bone complication of the mastoid process, with temperature and headache. The former are of the serous type, the latter, in a large proportion, of the purulent type. In the former any operation is contraindicated; in the latter, where there is complete loss of function, the labyrinth operation is decidedly indicated. The report of my cases includes only cases of diffuse labyrinthitis occurring as an early complication of acute otitis media.

*Presentation Report of Cases before the Section on Otology of the New York Academy of Medicine, December Meeting, 1913.

When I presented these cases at the New York Academy of Medicine, one of the gentlemen said in the discussion that the labyrinthitis might have been due to a faulty technic. Every otologist with a large experience of paracentesis sees a number of these cases, in proportion to the amount of clinical material seen by him, so that if they are due to any fault, it is owing to some abnormal anatomic condition of the middle ear, in which case every one is liable to see the same thing occur in his own cases. Be that as it may, one may draw his own conclusions from the following cases:

Case 1.—Miss M. H., twenty-six years of age, school teacher, singer, came to my office on October 4, 1913, suffering from a severe pain in her right ear, less so in the left. She displayed the typical objective and subjective signs of an acute otitis media in the right ear. The left drum was retracted, and the blood vessels along the long process of the hammer were injected. Paracentesis of the right tympanic membrane was performed immediately. In the afternoon of the next day I was called to her home by the attending physician. The patient was suffering from an intense vertigo, and when attempting to sit up she vomited and perspired. She had a pronounced nystagmus toward the left side, especially when looking toward the right. The pointing test established the fact that the finger deviated to the affected side, opposite to the direction of nystagmus; no caloric reaction on the right side. Cold water in the left ear diminished the spontaneous nystagmus, neutralizing it; hot water increased the nystagmus. Tuning forks were not heard by the affected ear, either by air or bone conduction. She lateralized the tuning fork toward the left ear. She was deaf to voice (with the Bárány noise apparatus in the left ear). There was no headache or temperature.

She was kept in bed in a darkened room, instructed not to turn her head, or to attempt to sit up. She took food while lying on her left side, for there was no nystagmus when looking toward the right. There was a slight serous discharge from the ear. Eleven days later I tested her in my office. The perforation in the drum had healed and the tympanum looked almost normal. There was

complete deafness on the right side. Tuning forks were lateralized to the left ear. She was still unsteady on her feet, with a tendency to fall toward the affected side, especially when she stood on one foot. Nystagmus was still present when she looked toward the left side. The turning test showed no reaction after ten turnings toward the left side (test for right labyrinth); and an after-nystagmus of about fifteen seconds after ten turnings toward the right side. Caloric test on the right side negative.

At another examination, two weeks later, she showed complete loss of function of the cochlear apparatus, but the turning test showed already a slight after-nystagmus when testing the right labyrinth. The patient was steady on her feet, but when dancing she still loses her equilibrium at times.

Case 2.—Mr. H. W., twenty years of age, student of art, contracted, after a plunge in a swimming tank, a left-sided purulent ear inflammation, for which he was brought to me during the second week of November, 1910. I performed an immediate paracentesis in the afternoon. During the night symptoms of labyrinthitis—vertigo, vomiting and perspiration when trying to sit up or when turning his head—made their appearance. I saw him the following afternoon, when the symptoms of labyrinthine irritation had been already displaced by symptoms of loss of function. There was no headache or temperature. He complained of dizziness when looking toward the healthy side. On lifting his head he vomited and perspired. He had a tendency to fall toward the affected side; he had a decided horizontal rotatory nystagmus toward the unaffected ear; no caloric reaction on the left ear. There was complete loss of hearing to tuning forks and voice; he lateralized toward the normal ear.

After being kept in bed for two weeks he was able to get around again; his spontaneous nystagmus was still present, any quick turning of the head would cause vertigo. When walking he still had a tendency to fall toward the affected side.

An examination three years later shows the following results: Ten turnings to left, testing the normal right

labyrinth, show an after-nystagmus of about fifteen seconds' duration; ten turnings to the right, testing the affected labyrinth, show also fifteen seconds' after-nystagmus. We have here the typical compensation, as described by Ruttin, with shortening of the after-nystagmus on both sides. As in rotating we start the labyrinthine fluid in both labyrinths, the after-nystagmus is caused by the sum of the reactions of both organs. If one is not functioning, that one factor is missing, and therefore the resulting after-nystagmus is shorter. The caloric test is negative in the left, and normal in the right ear. He is still deaf in that ear and lateralizes toward the normal ear.

Case 3.—Mr. I. M. Seen by me in the summer about two years ago, suffering from an acute otitis media of the left ear; temperature of about 102° ; drum bulging, red, and very painful. Paracentesis was performed immediately. He was left in the care of his physician. I did not see the patient again for about two weeks. He was then brought to me, led by a relative. He was staggering, with a tendency to fall toward the affected side. He gave the typical history of having passed through a diffuse labyrinthitis, with vertigo, vomiting, and so on. His ear was still discharging; there was no headache or fever; no pain over the mastoid or cortex. He had a complete loss of all labyrinthine functions.

I saw him last four weeks ago, when he brought another patient to my office, and subjected him to a thorough labyrinthine operation. He was absolutely deaf to forks and voice in the affected ear. He lateralized toward the healthy ear. Caloric reaction negative on the left ear, present on the right, although not so marked as usual. Ten turnings to the right produced an after-nystagmus of about twelve seconds; turning to the left, of about fifteen. I am aware that this slight difference is of no practical value, on account of the errors which necessarily must occur during the turning—be it the variation of the speed rotation or a slight modification of the position of the head—but the result shows likewise the compensation, with the shortening of the nystagmus on the unaffected side.

XXXVII.

A CASE OF SIMULTANEOUS BILATERAL CAVERNOUS SINUS THROMBOSIS TWELVE HOURS AFTER A SIMPLE MASTOID OPERATION.*

By ISIDORE FRIESNER, M. D.,

NEW YORK.

Mrs. A. G., twenty-seven years old, a native of Austria, was seen by me first at her home on Sunday, February 18, 1912. The history which she gave was the following: There had been no previous ear trouble. A week before I saw her she was suddenly seized with pain in the right ear, and after two days the ear began to discharge. The family physician was then called in. During the time that he was in attendance upon her she had more or less constant pain in her ear, but the pain was never severe. The discharge, however, became more and more profuse. There were no chills or sweats, and at no time that he visited her did her physician find her temperature higher than 101° .

On Saturday, February 17th, the patient had a chilly sensation and her temperature rose to 102° , accompanied by intense pain in the ear, mastoid and head. When I examined her she looked very ill, but she was seven months pregnant, had had considerable pain, and had suffered enough loss of sleep to account for her appearance. There was neither redness nor edema over the mastoid. The drum was red, but not bulging, and the canal walls were normal. There was a profuse, thin, purulent discharge, which was without odor. The mastoid was exquisitely tender over the tip, but less so over the antrum and emissary vein.

*Presented before the Section on Otology of the New York Academy of Medicine, December 12, 1913.

Operation was advised and consented to, and on Sunday afternoon a simple mastoidectomy was done. The mastoid process was of the pneumatic type. The cells were full of pus and granulations (probably swollen mucosa), but there was no bone disintegration. The septa between the cells were firm, and considerable force was necessary to break them down with a curette. At the operation the cells were completely exenterated, but neither dura nor sinus was exposed. The inner table over both was apparently normal. Upon admission to the hospital the patient's temperature was 102°. It remained at about this point until the following morning. Then it began a gradual but steady rise during the entire day, until, at 11 p. m., it had reached 105.8°.

Early on the morning following the operation the nurse informed me that during the night the patient had complained of pain in both eyes, and the eyes had become swollen. When I saw her she complained of intense pain in both eyes, and the eyes showed considerable edema of the lids and conjunctivæ. The bulbar conjunctivæ struck me, particularly, as peculiar, in that there was much chemosis, and the mucous membrane had taken on a translucent, almost transparent, appearance, and looked like a clear soap. During the night she had complained of slight headache, but the severe pain, which she experienced immediately before her operation, had disappeared and did not return.

The edema of the eyes and lids increased during the next two days and there was some exophthalmos, but all the signs were from the very beginning more marked on the left side, the operated ear being the right one. At noon on the day following the operation the patient vomited for the first time, and during the succeeding thirty-six hours she vomited at frequent intervals. Then the vomiting ceased and did not recur. On the day following the operation a blood count was made by Dr. G. Reese Satterlee, who reported as follows: Total leucocytes, 6400; polymorphonuclears, 80 per cent; large mononuclears, 10 per cent; lymphocytes, 4 per cent; transitionals, 6 per cent; eosinophiles, none. Blood very watery. Blood culture was negative. Two days later the blood count showed

total leucocytes, 13,400; polymorphonuclears, 85 per cent. Blood culture negative.

From the height of 105.8°, to which the temperature rose the day after the operation, it dropped during the next twelve hours to 102°. At noon of the second day the patient had a severe chill, lasting eight minutes, and within four hours the temperature had risen to 106° and had dropped back again to 102°, without a sweat. From this time on the temperature ran a typically septic course, with chills, but without sweats. The pulse became progressively more rapid and feeble.

The wound was dressed regularly and showed nothing abnormal. A full dressing was done in the presence of Dr. Wendell C. Phillips, who saw the case in consultation with me about fifty hours after the operation. The cavity presented nothing unusual. There were no discolored areas on the inner table over the sinus. The eye grounds were examined repeatedly by Dr. Alfred Braun. They were normal. Believing at first that we might be dealing with some acute local trouble, an orbital cellulitis or an erysipelas, I asked Dr. Dwyer to administer Hiss' leucocyte extract. In all ten injections were given.

There was but one septic metastasis. It occurred at the metacarpophalangeal joint of the little finger, on the left hand, and appeared on the fourth day after the operation. The orbital edema continued unchanged until forty-eight hours before death. Then, within a few hours, the swelling of the right eye disappeared entirely, while that of the left became very much less. Twenty-four hours before death the nurse reported that the patient had a convulsion. During a visit to her I observed one of these convulsions. They were labor pains, and the baby was born several hours before the patient died.

Heart, lungs and urine were repeatedly examined. Nothing abnormal was found. She had an atrophic rhinitis, probably due to chronic sinus disease, and had been advised to undergo some nasal operation, in Vienna, a year before. During the course of her illness further operative procedures were suggested, but were refused. Death occurred on the seventh day after operation. No postmortem examination was permitted.

XXXVIII.

CEREBELLAR ABSCESS.*

By C. E. PERKINS, M. D.,

NEW YORK.

Cases of cerebellar abscess, while not very uncommon, are always of interest to the otologist, and I therefore take the liberty of reporting this case, treated by me on the service of Dr. Dench, at the New York Eye and Ear Infirmary.

R. A., male, aged thirteen years, came into the hospital on July 1, 1912, complaining of trouble in left ear, with history of attacks of pain in the ear for past six months, associated with a slight discharge which had some odor. Two weeks previously he began to have headaches and pain in the neck and, later, in the arms and legs. He vomited, several times daily, after taking food, was dizzy, and walked with difficulty. The drum membrane was bulging. This was incised, giving some relief.

On admission the facial expression was somewhat dull; slight mental dullness; no aphasia. Pupils equal; react to light; fairly dilated. Frontal headache. Temperature 102.4°. Right ear normal. The posterior wall of the left ear was thickened and red. There was pus over membrana tympani, which was bulging. Myringotomy was performed, accompanied by free hemorrhage.

Physical examination showed lungs normal and evidence of cardiac involvement—probably mitral stenosis. An examination of the aural discharge showed a mixed infection, with pneumococcus predominating. White blood cells, 18,000; polymorphonuclears, 62.8 per cent. Blood culture negative.

Radical operation was done on the following day, July

*Presented before the Section on Otology of the New York Academy of Medicine, December 12, 1913.

3d. Cortex was hard. There was considerable involvement of the mastoid cells. The antrum and middle ear was filled with cholesteatomatous material. Following this operation the patient appeared much better. His temperature became lower, remaining between 100° and 101° , except for one sharp rise to 105° , which was accounted for by an acute tonsillitis.

On July 7th he complained of headache. Examination of the eyes showed changes in the eye grounds of both sides; slight ptosis in left upper lid.

July 8th, leucocytes, 16,400; polynuclears, 81 per cent.

July 10th, patient still drowsy. No nystagmus. Kernig's sign absent; reflexes normal. Lumbar puncture, 20 cc., was withdrawn under moderate pressure. Widal reaction was negative.

July 11th, more drowsy. Lumbar puncture, 20 cc., was withdrawn under increased pressure. Kernig mildly present. Positive Babinski—more on left side. As there was evidently some intracranial complication, an exploration was determined upon. Accordingly, the dura in the middle fossæ was exposed, both over the floor and externally, in the region of the squama. It appeared normal. A small elliptical incision was made through the dura, and a grooved director, passed in various directions, gave negative results, except when passed directly inward for about one and one-quarter inches. Then there was a gush of cerebrospinal fluid, evidently under great pressure, and in amount about four ounces. As the patient was in poor condition, the pulse being weak and in the neighborhood of 160, further interference was postponed. It was hoped that the evacuation of this fluid might produce some amelioration of the patient's condition. On the following day, July 13th, the condition was not improved. Leucocytes, 27,000; polymorphonuclears, 90 per cent. Blood culture negative. Temperature 103° . The dura was exposed over an area of about two inches in diameter, over the cerebellum, working back from the mastoid wound. At a point one inch posterior to the sinus, a small dural incision was made and pus was evacuated at a depth of about one-eighth of an inch. Nearly a teaspoonful of pus

was thus obtained. A cigarette drain was inserted and the wound was packed.

On the following day (14th) the patient seemed clearer and somewhat better. Temperature 102°. At 3 p. m. the wound was redressed and a gauze drain inserted. At 6 p. m. the patient ceased to breathe, although the pulse beat continued, and, notwithstanding artificial respiration and other measures, the patient died at 6:30 p. m. No autopsy was obtained.

This patient never had subnormal temperature or pulse. There was absence of nystagmus. The caloric reaction was present. The infection probably traveled from the mastoid internal to sinus.

The presence of ventricular distension as a result of cerebellar abscess is well shown in this case. This point is brought out and emphasized by Dr. Dench in his book on "Diseases of the Ear."

XXXIX.

MENINGITIS WITHOUT DEFINITE SYMPTOMS,
OCCURRING LATE IN MASTOIDECTOMY
CONVALESCENCE.*

BY GEORGE E. STEEL, M. D.,

NEW YORK.

The case which your chairman has requested me to report is as follows:

Joseph J., aged eight years, was treated by the family physician for a pain in the left ear for a period of three days, when he referred him to the hospital for treatment.

He entered the hospital February 28, 1913, and examination showed a typical mastoiditis with ruptured drum membrane. He was operated upon the same day, the usual mastoidectomy being done. The entire mastoid process was full of bloody granulations, and the dura of the middle fossa was exposed for a quarter of an inch. The sinus was not exposed. This was healthy and had no granulations. There was a marked hemorrhagic condition of the whole mastoid. Unfortunately, no culture was taken.

The patient made an uneventful convalescence and was discharged from the hospital eight days after the operation, returning for subsequent dressings. On the 13th of March, five days after his discharge from the hospital, he complained of general malaise, but no pain or discomfort of any kind. On examination his temperature was found to be 103°, pulse 120, and respiration 32. The mastoid wound looked healthy, and did not seem to be the cause of malaise.

His nose, throat, chest and abdomen were examined with negative results, and after consultation with members of the visiting staff of the hospital, and no diagnosis being made, the patient was sent to the ward for observa-

*Read before the Section on Otology of the New York Academy of Medicine, January 9, 1914.

tion. The following day, the condition remaining about the same, a blood count and culture were ordered, as well as a lumbar puncture.

The blood count showed 21 per cent of large and small lymphocytes, and 79 per cent of polynuclear neutrophils. The following day the report on the spinal fluid was: "Appearance cloudy, copper reducing substance absent; test for lactic acid showed a strong reaction; hydrochloric acid precipitation test for meningitis negative; sediment on centrifuging. There is a moderate deposit, made up almost entirely of polymorphonuclear leucocytes. Scattered through this are many diplococci or short diplobacilli. These are Gram negative, are very small, and are probably the influenza bacillus. Culture negative; blood culture negative."

On the results of the laboratory findings a fatal prognosis was made, but, the child seeming improved, it was difficult to convince the parents as to the gravity of the prognosis.

Three days later a second lumbar puncture was made, with the following results: "Twenty cubic centimeters in two specimens, one of which contained blood: physical character cloudy, but less cloudy than previous specimen; reaction neutral; copper reduction absent; lactic acid, present, marked; albumin moderate; globulin moderate; neutral fat, faint trace; cholin present, more than normal; meningeal index 2:5 (not conclusive). A diplococcus bacterium similar to that previously described, is occasionally seen. Blood count: polymorphonuclears, 53 per cent; lymphocytes, 47 per cent."

The meningeal index, the reaction of the fluid and globulin tests were not markedly positive of meningitis; on the other hand, the presence of cholin in amount more than normal, the absence of copper reduction and the high degrees of lactic acid, with the presence of albumin, makes the diagnosis, from a chemical standpoint, purulent meningitis. I might add that an examination of the eye grounds was negative. From the time of ascertaining the results of the first lumbar puncture the patient was put on five grains of urotropin every six hours. The temperature varied from 103° to 105°, and when the temperature was

high he was somewhat restless and irrational. It was three days after the lumbar puncture, or five days after his return to the hospital, before he began to develop clinical symptoms of meningitis, which gradually become worse. Died on March 24th, ten days after admission.

Without the laboratory findings it would have been extremely difficult to have made the diagnosis of meningitis before the late appearance of the clinical symptoms.

XL.

VARIATIONS OF SPHENOID SINUS DISEASE.*

BY GEORGE M. McBEAN, M. D.,

CHICAGO.

In studying the atypical forms of sphenoid sinus disease, we must take into consideration the relations of the sinus to the brain and meninges, to the hypophysis cerebri, to the cavernous sinus and internal carotid artery, to the cranial nerves, to the other nasal sinuses, and to the nasopharynx.

These structures may become associated with the sphenoid in a morbid process due to:

- (a) Extension of infection.
- (b) To exposure by necrosis of its bony wall from chronic suppuration.
- (c) To invasion of the sinus from the cranial cavity—for instance, by pituitary tumors.
- (d) To irritation or paralysis of the optic, motor oculi or trigeminus nerves, or the carotid plexus.
- (e) To association with the ethmoid in acute and chronic infections, polypi, atrophic rhinitis, and atrophic pharyngitis.

I have a series of more or less atypical cases, three of which went to autopsy. The other six were either seen in consultation with other men, or were sufficiently identified in other ways to make the diagnosis certain.

Case 1.—Brain Abscess in Frontal Lobe from Sphenoid Infection.—Arthur B., aged fifteen years, was referred to me in February, 1910, for what had been diagnosed as acute frontal sinusitis, for which he had been under treatment for one month. He was suffering from a severe paroxysmal pain in the median frontal line. His tem-

*Thesis presented for membership in the Chicago Otological and Laryngological Society, February 17, 1914.

perature had ranged moderately high for several weeks, although his pulse was very slow.

Examination.—No pus in nose; a small ulcer on cartilaginous septum; the region of left sphenoid too tender to probe, even under strongest cocain, and membrane red and granular in appearance; frontals and antra transilluminated perfectly. Ears normal. Eyes showed fair degree of bilateral papillitis, vision good. Reflexes all normal except a marked Kernig. Leucocyte count, 15,000. Skiagram negative. Spinal puncture—clear sterile fluid under pressure.

Consultation with Drs. Chislett and Grinker. Diagnosis: brain abscess in silent area.

Operation February 26th, with Drs. Chislett, Kahlke and Grinker. Opened left frontal sinus (the one supposedly diseased) and found it normal. Exposed and needled brain. Located abscess in left frontal lobe, just over the left sphenoidal sinus. Drained off about two drams of thick green pus. Culture showed diplococci. Progress almost uneventful. Pulse rose to normal; temperature fell; Kernig disappeared; pain cleared up. One month later developed endocarditis, which gradually subsided.

May 3d, two months after operation, pain in head again; Kernig positive, hernia cerebri. Needled brain again; small amount of pus.

May 9th, pain severe; loss of speech.

May 10th, trephined over left Rolandic area. Needled; no pus. Right sided paralysis following.

May 11th, died. Postmortem examination, limited to head, showed large abscess in left frontal lobe, with small dumbbell extremity over sphenoid. Sphenoidal sinus contained gelatinous mucus and a thickened membrane; other sinuses normal.

To my mind this was primarily a sphenoid infection, as shown by the extreme sensitiveness around the sinus, the inflamed granular mucous membrane and the gelatinous mucus in the sinus, postmortem. The brain abscess probably was secondary to the sinus infection, although no direct connection could be found.

Case 2.—Spontaneous Hemorrhage from Diseased Sphenoid.—Miss N., age twenty-eight years, a Swedish mas-

seuse. Had a postnasal catarrh, for which she had received treatment in the old country, but not here. Was awakened one morning by a severe nose bleed. Received various kinds of treatment until evening, when I first saw her. Found her pretty well exsanguinated, with immense clots hanging from both nostrils, and still bleeding.

I removed the clots, but could find no source for the profuse hemorrhage. Packed both sides with bismuth lint, after Freer's method.¹ Was unable to check the bleeding completely. Two days later, as alarming symptoms developed, we exposed both internal carotids, but were unable to check the hemorrhage. She died the next day.

Postmortem showed caries and necrosis of the external wall of the right sphenoidal sinus, and hemorrhage from the internal carotid through the sinus.

The spontaneous hemorrhage emphasizes the danger of curetting this sinus, except on its lower median walls.

This case and the following one I mentioned, by invitation, in the discussion of Dr. Maclay's paper, "The Interrelations of the Pituitary,"² before this society in 1911.

Case 3.—Hypophysis Tumor Which Invaded the Sphenoid.—I reported this case by invitation to the Chicago Neurological Society, December, 1911.³ Dr. Harvey Cushing, to whom I referred the patient, also reports it in his book⁴ as Case 11, pages 81 to 86.

Miss S. E. K., age thirty-six years. Refused to give history, as it might prejudice the diagnosis.

Condition March 4, 1910.—Height, five feet, eight inches; weight, one hundred and sixty pounds. Eyes rather prominent; left pupil larger than right. Right eye convergent; outward rotation limited. Vision: right eye, ten-tenths; left eye, eight-tenths. Some metamorphopsia in both eyes. Choked disc, plus 1.00 D. right, plus 2.00 D. left. Visual fields slightly contracted; color fields partly overlapping; natural blind spot slightly enlarged. Postnasal examination showed small polypus in right naris, coming from region of sphenoidal sinus, which on probing was found diseased. A tentative diagnosis was made of optic neuritis secondary to nasal sinus disease, with paresis of the right external rectus muscle. Operation advised.

March 16th, at operation, the sphenoidal sinus was

found packed with a polypoid mass, curetted and examined. Considered sarcoma and granuloma by different men. Vision and diplopia much improved after operation. After making the diagnosis the patient gave the history which had been previously refused. She had had amenorrhea for eight years without apparent cause, and had gained fifty pounds in the first year following cessation of the menses. About August, 1909, she had acute rhinitis, and all the eye symptoms had dated from that time. The diplopia of recent development was the most annoying symptom. There was a history of frequent, transitory glandular enlargements in various parts of the body, especially the axillæ. There was also a transient, non-inflammatory edema of the ocular conjunctiva, which appeared occasionally and lasted a few hours. Within three weeks after the operation the sinus began to fill up again. Drs. Shambaugh, E. V. L. Brown, Fish and Lewy, in consultation, urged further operative measures, which were refused, and patient left the city. November 18, 1910, she returned, showing a paracentral scotoma in the left eye; vision slightly reduced. A mass was projecting from the open sphenoidal sinus. Patient went to California without treatment. In January, 1911, patient consulted a physician in San Diego for severe headaches, accompanied by mental disturbances, transitory loss of memory, and increasing blindness. Potassium iodid had a remarkable effect, clearing up the pain at once. February 21st, returned to Chicago and had a Wassermann test made, which was reported "moderately positive," and the patient was put on larger doses of potassium iodid and daily intramuscular injections of mercury. Skiagrams showed an enlarged sella turcica. Dr. Grinker, in consultation, made the diagnosis of tumor in the region of the sella turcica, with increased intracranial pressure. Patient's vision at the time was further reduced. The form field was not contracted much, but the color fields showed a bitemporal hemichromatopsia. The scotomata were larger than in November. The patient was sent to Dr. Harvey Cushing in Baltimore, April 12, 1911, from whom the following notes were received:

"There is evidence of a large growth or hyperplasia

which has done more than merely occupy the sellar region, which has broken through into the cranial fossa itself, as shown by the general pressure symptoms; bilateral choked disc plus 2.00 right, plus 3.00 left; primary optic atrophy; central scotomata; vision low in both eyes. There is increased carbohydrate tolerance; subnormal temperature for some years; low blood pressure; adiposity; dry skin. No acromegalic facies, and no definite bone changes in the hands. Wassermann negative.

"Operation April 20, 1911, sublabial approach, submucous resection of the nasal septum. Removal of large portion of growth from sphenoidal sinus and distended sella turcica."

May 17, 1911, she returned to Chicago, practically blind from the large central scotomata. During the summer the vision failed completely, from atrophy of the optic nerve. The lapses in memory became more frequent, as did the headaches.

She entered the hospital August 10th. Headaches became very severe.

About September 15th the pain suddenly ceased and the mind cleared remarkably, probably from a leak of cerebrospinal fluid. She was comparatively well for a month, then the pain returned and she died October 20th.

The postmortem examination by Dr. Chislett, limited to the brain, showed a large tumor in the sella turcica, adherent to the bone, projecting into the sphenoidal sinuses and involving the left lateral ventricle, which it entered from below, not through the foramen of Monro. Microscopically it showed a hyperplasia of chromophobe elements.

This was the first case in which Dr. Cushing was "able to determine a rational therapeutic dosage of glandular administration on the basis of the established carbohydrate tolerance." Cushing thinks from "later experience that a postoperative radiotherapy might have inhibited the further growth of the lesion."

Case 4.—Acute Infection of Sphenoid with Frontal Pain.—Miss L. S., age seventeen years, had an acute cold in February, 1912, and was referred to me with a diagnosis of frontal sinusitis. No pus visible in nose anteriorly. Much mucopus in nasopharynx. Culture, pneumococci. Transil-

lumination of frontals and antra clear. Patient was in bed, so no skiagram was possible at the time. With Holmes' nasopharyngoscope a small stream of pus could be seen coming from the orifices of both sphenoids and collecting in the throat. The posterior ends of both middle turbinates were pale and edematous. Syme of Glasgow⁵ says this edema is characteristic of sphenoid disease, and may be followed by atrophy.

Without the aid of the nasopharyngoscope, I would probably have made an error in diagnosis, as all the pain was frontal, from irritation of the first branch of the trigeminus. The patient recovered under treatment without operation.

Case 5.—Acute Ethmosphenoiditis With Unusual Eye Symptoms.—Miss H. K. had an acute nasal infection in January, 1911, with pus in the superior and middle meati. Her pain was the classical one, back of the eye and in the occiput. Asthenopia was severe. A few days after the onset of the infection the right pupil suddenly became dilated, and this, with the pain, suggested glaucoma, but there was no increase in the tension. In a couple of days this pupil contracted and remained more or less myotic for several weeks, associated with spasm of accommodation.

Dr. C. G. Fellows and Dr. E. V. L. Brown saw her with me, but could find no local trouble in the eye to account for the dilatation or contraction of the pupil. Her Wassermann was negative, and so were her skiagrams.

The infection resisted all local medication, and was finally cured by an autogenous vaccine.

Another unusual symptom in this case was amenorrhea, which began with sphenoid infection and continued until its cure—a period of many months. This patient weighed about two hundred pounds, so I recalled Cushing's dictum to look out for the pituitary in fat amenorrheics, and had a skiagram made showing the sella turcica. This was normal, but I still think that the inflammatory trouble in the sphenoid caused some hypophyseal disturbance producing the amenorrhea.

Owing to the great anatomic variation of the sphenoid in size and shape, as demonstrated by Loeb,⁶ Onodi,⁷ Syme,⁸

Sluder,⁹ and others, almost any of the nerves in the lateral wall may be irritated in the inflammatory process. The most plausible explanation I can offer for the behavior of the pupil in this patient is that first the carotid plexus of the sympathetic was irritated by the inflammation, producing mydriasis; later the motor oculi was irritated, producing myosis. I am aware that in streptococcus infections certain changes have been observed in the pupil, but in this case the changes were unilateral, and therefore I believe were due to irritation of the nerve tracts. Baumgarten and Lapersonne are quoted by Onodi¹⁰ as having seen cases of oculomotor paresis and paralysis the result of sphenoid sinus suppuration.

(Sluder¹¹ also reports two cases recently, since this paper was written, in which dilatation of the pupil was associated with sphenoid disease.)

Case 6.—Chronic Ethmosphenoid Suppuration With Atrophic Pharyngitis.—Miss E. R., age twenty-two years, first seen in February, 1912. For five years had been troubled by large crusts forming in the nasopharynx during the night. The crusts were so tenacious that she removed them with her finger. She had some subjective sense of odor. No other symptoms.

I thought this was a case of Thornwaldt's disease, until with the nasopharyngoscope I found pus coming down the anterior surface of the sphenoid. I could not catheterize the sinus, and she would not submit to operation. This case, with its absence of typical sphenoid symptoms, would almost certainly been wrongly diagnosed but for the help of the Holmes instrument. There was no headache, no apparent nasal discomfort, nothing to be seen in the nose anteriorly. Apparently a case of atrophic pharyngitis—really a case of sphenoid disease. Gruenwald, I believe, was the first to call attention to the posterior group of cells in atrophic pharyngitis cases.

Case 7.—Atrophic Rhinitis With Sphenoid Suppuration.—Miss Blanche B., age twenty-two years. Had atrophic rhinitis and the pain of sphenoid disease back of the left eye and in the occiput. Pus could be seen in the left ostium sphenoidale by anterior rhinoscopy. It was very easy to remove the nasal wall of the sinus for drainage

and ventilation, and the relief of pain was marked after healing took place.

I do not know what the ultimate effect on the atrophic rhinitis was, as the patient discontinued treatment after the relief of the headache.

Cases 8 and 9.—Pansinusitis.—Came to me in 1906. Miss A. M., age thirty years, and Mrs. M. A. H., age forty years. Two old cases of pansinusitis which had existed many years. Both had many polypi, and both had pains in almost all parts of the head. The sphenoids were the first sinuses opened in each case, and the relief of the occipital pain indicated its origin. The other sinuses were operated later. Miss A. M. also had chronic suppurative otitis media with cholesteatoma and a polyp in one ear, which I removed. She died in 1912 of pneumonia. Mrs. M. A. H. is practically well.

RESUMÉ.

First, I believe that sphenoidal diseases is much more common than was formerly supposed. This list of nine cases in six years' time in my own practice convinces me of its frequency. With more careful postnasal examinations, especially with the nasopharyngoscope, many such cases will be found. With the routine use of the probe and the catheter more cases will be recognized. The sphenoid is the easiest of all nasal sinuses to catheterize, as a rule.

Headache in my cases was the most constant symptom. Most often it was occipital and back of the corresponding eye. Twice it was frontal (once in brain abscess case). Pain was absent in the atrophic pharyngitis case. The pituitary case had a pain like Casselberry's¹² university professor, "dull and boring, sometimes bursting in the middle of the head." The typical pain in the occiput is very similar to that of eye strain produced by ocular hypophoria, and must be differentiated by exclusion.

The eye symptoms were variable or lacking. In some cases difficulty in using the eyes for near work. In one case inequality of the pupils and spasm of the accommodation. In the brain abscess and tumor cases there was bilateral papillitis, of course, due to intracranial pressure. In none of my other cases was there any fundus change.

Loss of vision in only one case—the hypophysis tumor from involvement of the optic nerve.

Discharge, in one case forming crusts in the nasopharynx, in another, crusts in atrophic rhinitis. In the other cases, of a mucopurulent character.

Polypi abundant in two old multiple sinus cases. Single polyp in brain tumor case.

Subjective sense of odor in only one case—that of atrophic pharyngitis.

Loss of smell in atrophic rhinitis and old polyp cases.

Suppurative ear disease in only two—the hemorrhage case and one of the polyp cases.

Termination.—Three in death, all with postmortem examination, hemorrhage, brain abscess, brain tumor. Two in recovery—acute cases. Three in operation with benefit or cure. One, no treatment.

Presentation of a cast of the left sphenoidal sinus which I made from a skull kindly loaned to me by Dr. Major H. Worthington.

The sinus measured 46 mm. anteroposteriorly, 29 mm. laterally, 15 mm. vertically. There was a lateral prolongation behind the sphenomaxillary foramen.

The right sinus I was unable to cast, but it was only about the average size.

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SOCIETY PROCEEDINGS.

NEW YORK ACADEMY OF MEDICINE,
SECTION ON OTOTOLOGY.

Meeting of December 12, 1913.

A Case of Latent Mastoiditis Complicated by Toxic and Irritative Cerebral Symptoms, Accompanied by Blindness and a Streptococcemia Caused by Trauma. Operation. Recovery.*

By S. J. KOPETZKY, M. D.

DISCUSSION.

DR. STRAUSS said that he would like to refresh Dr. Kopetzky's memory on one point, for, if his own recollection was correct, he had omitted one important feature. Did not the patient have an ear infection some years previously, for the relief of which a mastoid operation had been advised and refused, and which was apparently cured without operation? Apparently she had had a rather serious condition.

DR. KOPETZKY replied that he had reported that the patient had had an acute attack in that ear. He was told that she had had a mastoid infection.

DR. STRAUSS, continuing, said that, in interpreting this case, the former attack was a factor of some importance. When he saw the patient, four days after the blow, he had been impressed by the fact that the blow which she had received (which consisted merely of falling on the sidewalk and striking her head against an iron fence) had not been sufficient to cause headache, abrasion, or ecchymosis, and she had paid no attention to it. Two days later the headache commenced, and with that there appeared an edema, which had no redness and was more or less circumscribed in the frontal region, but later advanced to the eye and involved the conjunctiva, so that the eye could not be closed. After a day or two of no tempera-

*See page 391.

ture she developed an urticaria, while the edema over the right eye disappeared and appeared again over the left, with the same edema of the conjunctiva and with transference of the headache to the left side. Inquiry into the patient's previous history revealed that she had experienced recurring urticarial attacks, evidently being subject to some anaphylactic reaction. Her eye grounds were normal. At that time she was beginning to be incoherent and to cry out, and was restless, but without the presence of any objective symptoms of meningeal irritation. The diagnosis was made that the fall had nothing to do with the condition, which seemed to be the result of a toxemia. Dr. Jacobi had made a lumbar puncture, but the report obtained was not very satisfactory. A day or two later the patient had a sudden rise of temperature (103°), and at that time a small focus was discovered in one of the lungs, such as one might expect with a slight bronchopneumonia. The patient was then removed to the Red Cross Hospital. The temperature continued, and she was delirious and incoherent. She was unable to read or to hold a coherent conversation. About this time she developed a Babinski in the right foot, with loss of right abdominal reflex, and lumbar puncture showed increased pressure of the spinal fluid. The eyes showed the first stages of optic neuritis. Dr. Elsberg, myself, and others felt that the patient might not have a brain abscess, but that, if there were one, the symptoms pointed to the left side—the Babinski and the incoherency would point to the left frontal lobe. It was decided that, under the circumstances, if a surgeon could make an exploration with the least possible damage, it was better to take the risk and do it, than to overlook a brain abscess.

The operation was done, the frontal lobe punctured in various directions with negative result, and the patient was not injured. That is the way in which these exploratory operations on the brain ought to be conducted.

Following the operation a blood culture was taken which showed streptococcemia. The culture was taken to Dr. Elsberg, who has elaborated a method of preparing vaccines which is somewhat different from that usually employed, but which has not yet been published, although some of the physicians in the city have used it. This vaccine was given intravenously, administering it every day, starting with 50,000,000.

Dr. Strauss said that, if he recollected correctly, as soon as the vaccine was given the temperature began to fall—if it had not, in fact, begun to do so before the vaccine was given. At all events, the temperature began to fall synchronously with the administration of the vaccine.

It was questionable whether in this case much stress could be laid upon the efficacy of the vaccine. However, the blood became sterile, the mastoid developed, and again, for purposes of safety, the left temporosphenoidal lobe was explored. So we are not certain that the vaccine really had anything to do with the result.

Dr. Strauss said that he was now inclined to believe that his first opinion regarding the case was correct, and that all the symptoms, even the Babinski, were due to the toxic condition. The Babinski reflex has been shown to occur in intoxications, in eclampsia, and even in epileptic convulsions, so that its appearance here, while regarded at the time as possibly pointing to an organic lesion, may have been due to a toxic condition. The further development of the case seemed to confirm this—unless there may have been a latent mastoid process which the blow in some way started into activity.

DR. J. GUTTMAN said that Dr. Kopetzky had just reminded him that he had seen the patient before. At that time he had found all the symptoms described by Dr. Kopetzky, but had interpreted them differently. As he recalled the case, he had found a swelling under the eyebrow region of the frontal sinus on both sides. This was the only objective symptom. Careful examination showed no ear symptoms; the eye grounds were normal; there was nothing in the nose; no pus anywhere. The subjective symptoms of which the patient complained were pain in the head and some disturbance of vision, which could not be verified objectively.

Dr. Guttman said that the patient's family physician had consulted him, but that he had been unable to arrive at a diagnosis. The patient gave a vague history of some trauma, and it seemed best to keep her under close observation. Certainly Dr. Kopetzky and the other physicians who had charge of the case were to be congratulated upon the fortunate result of their procedure. It was certainly very difficult and almost impossible to make a diagnosis on the conditions presented. The going into the brain and laying bare the frontal

lobe, without any diagnosis and without any ill effects to the patient, was a very excellent piece of surgical technic.

It is true that streptococcus mucosus, which is apt to cause all kinds of brain complications, even in quite insignificant otitis, was found in this case, but this alone did not give sufficient reason for entering the brain. The radical mastoid operation, as well as the entering into the temporosphenoidal lobe, without any positive diagnosis, again showed how lucky both the surgeon and the patient were, and both were surely to be congratulated.

DR. FELIX COHN inquired if there was a radical operation in the sense of the Schwartz-Stacke operation.

DR. KOPETZKY replied that they did not do radical operations for acute mastoiditis, but that this was a radical mastoid operation; that is, a complete exenteration of all mastoid cells and the removal of the bony posterior canal wall to throw the tympanic, antral and mastoid cavities into one connecting cavity. This was done to provide a larger area; to afford access to the cerebrum through the mastoid wound.

DR. PERKINS said that certainly Dr. Kopetzky, Dr. Elsberg, Dr. Strauss, and the others connected with the case were to be congratulated on the recovery of the patient. Some years ago he had reported a case in which the patient had had an acute mastoid, and developed convulsions on the opposite side, beginning at eight o'clock in the morning and continuing to one o'clock in the afternoon, the patient in the meantime becoming comatose and practically in articulo mortis. The temporosphenoidal lobe was explored, on the possibility of a tumor explaining the condition, but nothing was found. There was some flow of blood, but we could not say from what vessels. We thought we had done all we could, and the patient was put to bed. The convulsions ceased, and the patient recovered entirely. We thought that we might have done something that cured the patient.

DR. KOPETZKY, in closing, said that the case would be published in full later, and the various details given which could not be presented in a hasty manner. The frontal lobe was explored because the symptoms seemed to demand it. In order to present the case, some title was required, and he had called it mastoiditis. His own idea was that the infection in the mastoid process was latent. It was not clear what had

happened, but if such a case had died without exploration, it would have been ascribed to a brain abscess.

There were only two tangible facts: one, the positive blood culture, and the other the form of mania present, and the fact that a similar organism was found in the ear as was previously demonstrated in the blood. Dr. Guttman had seen the case, and Dr. Frank Van Fleet had examined the patient, and made the same report that Dr. Guttman did. The optic discs were normal, and, later, the optic disc was involved. The progressive condition of the case was striking.

These were the only facts. The rest was theory. We did the best we could, and the patient recovered. Those who saw the case at the time were justified by the symptoms in assuming the presence of an abscess.

(1.)

Sinus Operation—Resection of Internal Jugular Vein—Pneumonia—Metastatic Abscesses in Ankle Joint—Recovery.

(2.)

Sinus Operation—Ligation of Internal Jugular Vein—Shock During Operation—Prolonged Convalescence.*

BY M. D. LEDERMAN, M. D.

DISCUSSION.

DR. PHILLIPS said that he had noted a growing tendency to abandon the resection of the jugular vein. A good many men are now simply ligating, without any effort to resect, and claim that they get as good results. He himself had not had many cases of late, but the matter was worthy of consideration. Of course, one should ligate low down. He understood that the Boston otologists, almost without exception, ligate without resecting.

DR. SMYTH asked if Dr. Lederman had noted any tangible benefit from the urotropin in this case. He had formerly used it, but had given it up.

DR. EAGLETON said that he had been especially interested in the first case presented by Dr. Lederman, and congratulated the doctor upon the good results he had secured under the treatment pursued. The fact that both hips were involved and

*See page 395.

not opened, and that the child has free movement of both hip joints, was evidence that the infection was not in the joint itself. Dr. Eagleton then cited a case of thrombosis in a child which was operated upon in the usual way, with ligation of the jugular. Later it had repeated chills, and complained of pain in its foot, and by the advice of an orthopedist an extension was put upon it. Two or three days later the hip was found to have become spontaneously dislocated. There was no evidence of suppuration, and a needle was inserted with negative result. Dr. Eagleton said that he was convinced that the child was septic, and advised cutting into the joint. This was done and pus evacuated. Later the child drew up its other leg and again complained of pain. In two days, while under the same treatment, this joint also became dislocated, and, upon being cut into, discharged pus. After three months of sepsis the child recovered, but with disability of both hips.* Since that time he had seen a similar case of involvement of the hip joint, and had been surprised that another orthopedist should have again advised waiting. He (Dr. Eagleton) thereupon stated that he had waited before in a similar case, and knew what would happen, and advised incision. This was done and serum evacuated. The child was immediately relieved and the temperature went down. The child now walks with a good joint.

Dr. Eagleton stated that in all cases of septic involvement of a joint, he now opens the joint immediately. He has done this at least ten times, and there has been complete restoration of the function of every joint opened; whereas, if this is neglected, and there is suppuration, the functions of the joint are lost. We have two conditions of involvement in joints during general sepsis, one a toxic condition, but there is no way of telling whether it is toxic or serous from beginning pus. His own opinion was that every such joint should be opened. If this is done aseptically, there is no danger at all.

Dr. SEYMOUR OPPENHEIMER said that he also had seen a number of metastatic joint involvements. As a rule, the general surgeons are inclined to leave these joints alone, the argument being that there is great danger of infecting a joint

*Archives of Otology, Vol. XXXIV, No. 6, 1905.

that is not otherwise infected. He had also had experience with a case, the facts of which Dr. Eagleton was acquainted with, where he operated on an acute mastoid with sinus involvement. Later the patient developed a swelling of the knee joint. Dr. Oppenheimer advised exploration, but the local surgeon refused, and the patient returned to Newark and was treated there by a surgeon who also was opposed to any interference. Dr. Oppenheimer said that he understood the patient had recovered without surgical interference. Both surgeons contended that they were unable to say that there was a bacteriologically infective process, and were fearful of converting a sterile joint into a septic one. That individual case, of course, proves nothing, but in the large majority of cases that he had seen he knew of but one instance where there was any subsequent lack of mobility following these infections. He had never seen a case of joint infection associated with sinus thrombosis that did not get well. Metastatic infection of the joints is far less serious in its prognosis than that involving other regions. Where a metastatic process involves the cardia or the pleural cavity, the cases invariably die. The joint involvement cases usually get well.

Dr. Lederman had referred to the peculiar whitish formation of the thrombus. That seemed to be characteristic of a sterile thrombus, which probably was the reason why Dr. Lederman could safely ligate above the thrombus; bottling it in, as it were. If it had not been sterile, there would have been a continuation of the septic symptoms. The fact that the blood culture was negative showed that the lower end of the thrombus was sterile.

Dr. OPDYKE told of a case along this line which had come under his observation. The patient was eighteen years of age, of good physique, and he had operated upon him for a mastoiditis, the patient making an uneventful recovery. Last year he had an attack in the other ear, from which he slowly recovered and now is in good health. This time, as before, the lateral sinus was close to the posterior wall—not more than an eighth of an inch separating them. The temperature was 106° previous to the operation. Following the last mastoid operation, it being on the left ear, he had an involvement of the left shoulder, left elbow, and left knee. The infection was streptococcic. The joints were not opened at first, but

the knee became so advanced that it was operated upon, and the patient has a normal joint. He was in bed for four months, and during convalescence a large amount of vaccines were given, with the result that his high temperature and joint affections were relieved. His hearing is now normal in each ear, and he has perfect use of all his joints.

DR. LEDERMAN, in closing, replying to Dr. Eagleton's remarks in reference to the joint invasion, said that the joints were not involved in this instance, but that the infection was external to the joint. In reference to letting the joint alone, he thought that was also the idea of the surgeon in attendance—to avoid surgical interference if possible.

He mentioned a case of very profound sepsis which he had presented some time ago, where a jugular resection was done and which developed a septic pneumonia with symptoms of empyema. The surgeon, Dr. Henry Roth, absolutely refused to sanction any attempt at interference, to avoid disturbing nature's attempt at limiting the area of suppuration. This patient also developed a pulmonary abscess, which she evacuated through the mouth. She recovered nicely. In cases where the sepsis is so profound, it is advisable to let well enough alone. He could not say whether or not the thrombus was sterile, as the specimen was spoiled for laboratory purposes. The child apparently had a septic pneumonia.

Replying to Dr. Smyth's query about urotropin, Dr. Lederman said that it seems to be the theory that this drug acts in a prophylactic manner. It was given in pursuance of the teachings of Dr. Harvey Cushing, who claims that it should be given in all cases of cerebral or spinal infection. Personally, he had recently taken it during an attack of coryza, and thought that it prevented the purulent stage from appearing. He was inclined, however, to believe that it did good. It is supposed to act only in an acid medium, not an alkaline one. In the first case, six distinct areas in the feet were opened, and pus was found. It was quite evident that these foci were due to metastasis, as the bacteriologic examination showed the same pathogenic microorganism.

Diffuse Labyrinthitis Complicating Acute Otitis.*

BY ERNST DANZIGER, M. D.

DISCUSSION.

DR. PHILLIPS said that he had been much interested in the histories related by Dr. Danziger, and had only one criticism to make, namely, that it would be well to change the title of his case report to read "Three Cases of Acute Diffuse Serous Labyrinthitis." None of the cases described were purulent labyrinthitis. They were cases of purulent middle ear disease with serous labyrinthitis, a complication he himself had seen several times, with similar results—all recovered, and with permanent loss of hearing. In most of the cases the temperature never ran higher than 100° to 102° , with excessive vertigo. The pain is not very great. The symptoms are not those seen with diffuse purulent labyrinthitis. Such cases, associated with acute purulent otitis, are almost always fatal. He related a peculiar circumstance which occurred in one of his cases. The patient was a girl, with acute purulent otitis media, and paracentesis was necessary. This was performed by a man of not very great experience, and the vertigo developed immediately after the paracentesis. He had always suspected that the paracentesis knife had disturbed the stapes sufficiently to evoke a serous labyrinthitis.

DR. FELIX COHN said that we should be indebted to Dr. Danziger for having brought this subject before the notice of the Section. These cases of acute otitis, complicated by labyrinthitis, are of especial interest, not only because they are labyrinthine cases, but on account of their comparatively extreme rarity. In all, the speaker had seen, so far as he could recall, seven cases in about twenty-four years. Dr. Danziger had apparently seen three cases in the last two years, but had not seen any, previously, in about twelve years, so that the statistics with regard to the frequency, with the exception of the law of triplicity in Dr. Danziger's cases, about tally.

In regard to Dr. Phillips' remarks about the possible traumatic origin, due to the paracentesis in Dr. Danziger's cases, in all of which the labyrinthitis apparently occurred after paracentesis, Dr. Cohn recalled such an etiology in some of

*See page 406.

his own cases; but in these instances the number of cases of otitis, complicated with labyrinthine symptoms, which occurred before the operation of paracentesis, were about equal to those occurring after paracentesis, so that such an etiology could not explain all the cases. Inasmuch as time would not allow him to enter thoroughly upon a description of the cases, he begged the indulgence of the Section to allow him to refer briefly to a few of them.

A case occurring in the early '90's was that of a young lady, suffering from an acute left-sided otitis during one of the severer la grippe epidemics. Paracentesis was performed, and four weeks later the patient presented manifest labyrinthine symptoms—vertigo, staggering, etc.—from which she recovered completely in a few days. The labyrinthine symptoms were explained as having been caused by a dislocation of the stapes, due to an acute suppuration, inasmuch as what resembled an ossicle could be seen, for a day, through an intact and otherwise normal drum membrane.

Another case, likewise occurring in the early '90 epidemic, was that of a married English woman, of about thirty, who had been treated by a colleague for an acute left-sided otitis. When the patient was seen by Dr. Cohn, she was suffering from symptoms of vertigo, etc.—doubtless what would today be called a labyrinthitis, though, in those days, it was spoken of as labyrinthine pressure caused by pus accumulation. Paracentesis was immediately performed, followed by amelioration of the symptoms. There was a complete recovery in a few weeks, but with total loss of hearing. A traumatic origin could surely be excluded in both of these cases, as in both the labyrinthine symptoms were present before the paracentesis.

A third case was that of a male, in the twenties, who developed a double-sided acute otitis, requiring double-sided paracentesis, which, in turn, was followed by purulent discharge, and a left-sided labyrinthitis on the next day. Complete recovery. The purulent otitis on the left side was somewhat prolonged, and was accompanied by continuous headaches. The hearing was entirely lost.

Another case was that of a female, alcoholic, forty years of age. This patient had a right-sided acute otitis, accompanied by labyrinthine symptoms and by a facial paralysis, twenty-

four hours after the beginning of the otitis. The labyrinthine symptoms, as well as the facial palsy, rapidly disappeared after the establishment of a discharge by paracentesis. The patient, however, developed an acute mastoiditis which required an operation, resulting in complete recovery. It was of interest to note that, after the mastoid operation, about four weeks from the commencement of the otitis, the patient again developed a transient facial paresis, which entirely disappeared in a few days—an unusual occurrence in acute mastoiditis, but of especial interest on account of the paralysis in the beginning of the otitis.

As to prognosis, all the cases observed by the speaker had recovered, with the exception of one case, seen a few years ago, and, were it not for that experience, he would probably never have considered the question of operative interference in these cases. The one fatal case of acute otitis was a fulminating case of pneumococcus otitis, followed by purulent labyrinthitis on the fourth day after the beginning of the otitis, and by a pneumococcus meningitis a few days later, terminating fatally ten days after the onset of the otitis. Up to the time of this case Dr. Cohn had considered the prognosis of these cases to be always favorable. Whether, in view of this experience, in cases of acute otitis labyrinthitis, with complete absence of reaction, he would still hold this opinion, he could not say. He was rather inclined to believe that, in view of this experience, he might possibly be more disposed to interfere than he was before having observed this fatal case. Whether, however, much would be accomplished, even by an immediate operation in these fulminating forms of otitis with labyrinthitis, seemed dubious, inasmuch as the meningitis was probably already present, even if not diagnosticable, and we could hardly operate soon enough, if we operated at all. Fortunately, the fatal cases seem rare—apparently only one in ten cases, adding the two statistics together.

DR. PERKINS said that Dr. Danziger had presented these cases admirably. They did not have much temperature, and, giving them the diagnosis of serous labyrinthitis, would it have been possible that the labyrinth became directly infected from a purulent middle ear? If Dr. Danziger had performed a myringotomy and infected the labyrinth by the operation, he would not have had a serous labyrinthitis, but a purulent

one. Dr. Perkins knew of two cases in which this accident had happened, with fatal termination through purulent meningitis.

Dr. FRIESNER, too, believed that injuries to the labyrinth by paracentesis resulted as a rule in suppurative labyrinthitis. If, moreover, the cases of Dr. Danziger, which were in all probability cases of serous labyrinthitis, were due to injuries caused by paracentesis, the symptoms would have come on at once. There would have been no interval between the paracentesis and the labyrinthine symptoms.

Cases of labyrinthitis complicating acute otitis divide themselves naturally into two groups: first, those cases of labyrinthine involvement which occur early in the progress of the acute otitis media. Dr. Danziger's cases all occurred in the first two or three days. Dr. Cohn's cases, too, occurred in the first few days. Most of these cases are serous, and we consider them so, despite the fact that, occasionally, the functional tests show total deafness and complete loss of irritability of the static labyrinth during the height of the labyrinthine symptoms. We all know of those unusual cases of "otitis cum meningitide," in which the infection spreads rapidly from the middle ear through the labyrinth to the meninges, so that the otitis and meningitis appear almost synchronously. Yet, notwithstanding these cases, the vast majority of labyrinthitides which occur in the early stages of acute otitis media are serous. The cases of the second group come on two, three, four or many weeks after the beginning of the acute otitis, particularly where there are already symptoms of mastoiditis. Often the infecting agent is a capsulated coccus. A labyrinthitis that supervenes under these conditions is almost invariably purulent.

Dr. Friesner said that he must disagree with one statement which Dr. Danziger made. Dr. Danziger expressed a doubt that cases such as he reported would be left to heal spontaneously in the future. Dr. Friesner wished to repeat that these cases are recognized as serous and should be let alone. They will probably recover spontaneously in the future, just as they do now.

Dr. DANZIGER, in closing, said that he had intentionally left out the word "serous" in describing the labyrinthitis, for he thought that one could recover from purulent otitis also, as in

some cases of scarlet fever with a parotitis; and he thought that in chronic otorrhea we sometimes have cases of labyrinthitis purulenta with spontaneous recovery.

Dr. Perkins and Dr. Friesner had referred to the traumatic theory of these cases, and had been such able attorneys that he had nothing to add to what they had said, but he wished to subscribe very heartily to Dr. Friesner's remarks in regard to differentiating between a labyrinthitis which is complicating a purulent otitis media, at an early stage, and a labyrinthitis occurring later. The former is in all probability serous, and will recover spontaneously; the latter, occurring at a time when mastoidal symptoms, especially necrosis of bone, make their appearance, means an extension of the destructive process to the labyrinth, and requires operation.

Cavernous Sinus Thrombosis Secondary to Labyrinthitis.*

By ALFRED BRAUN, M. D.

Simultaneous Bilateral Cavernous Sinus Thrombosis Twelve Hours After Simple Mastoid Operation.†

By ISIDORE FRIESNER, M. D.

DISCUSSION.

DR. PERKINS said that five or ten months ago he had seen a case on Dr. Dench's service in the infirmary, which, while not like Dr. Friesner's case, was peculiar in a way. This patient had had a mastoid operation, followed by sinus thrombosis. The jugular was tied, and soon after the eye swelled up and the patient had a cavernous sinus thrombosis on the opposite side. No autopsy was permitted. The question came up as to how the infection could have traveled to the opposite side. There were two opinions on that. One was that it traveled by the way of the torcular; and the other, that it was by way of the inferior petrosal sinus and across to the opposite side, via the transverse sinus.

DR. LEDERMAN said that there was probably some infection in the large sinuses before it reached the cavernous sinus. As to the findings in these conditions, he thought we did not obtain a sufficiency of autopsies in our fatal cases. In cases

*See page 368. †See page 410.

that terminate fatally, more autopsy work, in the future, would materially assist in ascertaining the origin and route of these complications.

DR. PERKINS said that in those cases in which the cavernous sinus became involved, without lateral sinus involvement, and in which the mastoid process was the cause of infection, the route taken was through the petrous portion of the temporal bone, which was probably pneumatic—the same as we have sixth nerve involvement from suppuration at the petrous tip.

DR. FRIESNER said he was aware of the fact that involvement of the cavernous sinus was not necessarily an extension from an inflamed and thrombosed lateral sinus. He mentioned the condition of the bony wall of the sigmoid groove merely as an operative finding. He did not pretend to tell how the cavernous sinus became infected in this case. The infection probably was metastatic. It struck him as worthy of mention that in Dr. Braun's case, from a pathologic point of view, and in his own case, from a clinical point, it was determined that both cavernous sinuses were involved at about the same time. He wondered if this was a common occurrence, for, if it were, the operation of draining one cavernous sinus would be futile.

DR. ALFRED BRAUN, closing: In answer to Dr. Hays' question, I would like to say that in both Dr. Friesner's and my own cases the diagnosis was very easy. In these cases we are not dependent upon the blood culture and the general symptoms for our diagnosis. The local signs are very marked. With general septic symptoms, proptosis, edema of the lids, and conjunctiva, and paralysis of the third nerve, especially if the condition be bilateral, there can be no mistake in the diagnosis. In contrast to the cases of lateral sinus thrombosis, metastatic abscesses are very uncommon with cavernous sinus thrombosis, which is in accord with the fact that the blood culture is usually negative in cavernous sinus thrombosis.

Cerebellar Abscess.*

By C. E. PERKINS, M. D.

*See page 413.

NEW YORK ACADEMY OF MEDICINE,
SECTION ON OTOTOLOGY.

Meeting of January 9, 1914.

Meningitis Without Definite Symptoms Occurring Late in Mastoid-ectomy Convalescence.*

BY GEORGE E. STEEL, M. D.

DISCUSSION.

DR. DANZIGER asked if the nose had been examined to see if there could have been a metastatic process from that source. Six years before he had seen the case of a young girl of thirteen, who suffered from an acute otitis media following la grippe. She ran a normal course for two weeks, and later he was called to the house, when she gave a history of severe headaches and vomiting. The ear showed no signs of mastoiditis excepting that there was a slight tenderness on pressure. She was sent to the German Hospital and a mastoid operation was performed, which showed an osteitis. The blood examination showed a high polynuclear count, and the temperature continued high for another week. Both the typhoid and Wassermann test proved negative, and nothing was found excepting a slightly enlarged spleen. Finally, after a week, she was taken to the operating room for another exploratory operation. The sinus was exposed and found to be normal, as was the dura. The temperature still continued, and a lumbar puncture was performed, which showed a cloudy fluid. The patient died at the end of the second week. An autopsy was performed, revealing a basilar meningitis, and upon opening the frontal sinus it was found to be filled with a mucopurulent secretion. Whether that was a postmortem condition or not, he could not say, but attention should be given to the accessory sinuses in these obscure cases, as being a possible source of infection through the nose.

DR. STEEL, replying to Dr. Danziger, said that he had mentioned that the nose was thoroughly examined and that nothing was found.

*See page 416.

The Symptoms and Rational Treatment of Relaxed Ear Drums.

DR. HAROLD HAYS said that when the patient first presents himself, stating that his hearing is gradually diminishing, an attempt is usually made to relieve the condition by some form of massage of the middle ear. There is often an obstruction in the eustachian tube. By these means too great pressure is frequently used, and the drum, being the least resistant part of the ear, gives way.

Too little attention has been paid to the mechanism of the middle ear, and few of us have considered the great importance that is played by the footplate of the stapes and the ligament of the oval window. One does not have to be much of a physicist to realize that it is impossible to have true sound waves conveyed through a drum that is diminished in tension. A relaxed drum will cause a relaxation of the entire ossicular chain, therefore, causing the loss of tension in the ligament of the oval window.

Most patients suffering with relaxed ear drums also are paracutic. This can be accounted for by the fact that in these patients the ligament of the oval window is relaxed, but that when there is a great noise the increased tension exerted causes a tightening of the tensor tympani and stapedius muscles, resulting in a more proper tension being created in the ligament surrounding the oval window.

The treatment which he uses for relaxation of the drum and the ossicular chain is mostly that suggested by Mr. Heath. This consists in making daily applications to the drum, which creates a thickening of the membrane, thus tightening both the circular and straight muscular fibers. As the drum is drawn out there is a tendency for the joints between the ossicles to loosen, with the result that there is more tension put on the ligament of the oval window. The treatment should be repeated daily over a period of four to six weeks, and sometimes it is necessary to repeat this treatment three or four times at intervals of two to three months. The strongest solution used for the application is cantharides collodion. Weaker solutions are made up as follows: to one ounce of water is added one grain of cantharides and one grain of potassium hydroxid. One-half of this solution is poured into a one ounce bottle and made up to the full ounce with glycerin. A similar dilution is made from this for the

number three and four solutions in the same manner. One must vary the strength of the applications according to the amount of reaction which he gets. In order to protect the canal from irritation from the solution while the applications are made to the drum, the canal should be wiped out with a salve composed of one per cent of yellow oxid of mercury. Dr. Hays stated that he was not content with applications to the ear drum only. There is often a stenosis of the eustachian tube which must be overcome by proper use of bougies. Under no circumstances should the middle ear be inflated. One should always warn the patient that during the time of treatment his hearing will be considerably impaired. It is most evident that while the inflammatory reaction is going on that very few sound waves can be transmitted through the middle ear.

Dr. Hays stated that he had treated up to the present time about twenty cases in this manner, most of whom showed quite some improvement. He thinks that it is too early to say definitely what the final result in these cases may be, but one thing is evident—that in no case has any harm been done, and all the patients seem to feel better after the treatment is over than they formerly did. He thinks that it is very important to differentiate the various forms of deafness, and that we should not be satisfied that we have attained any result until the patient himself appreciates that his hearing is improved.

DISCUSSION.

DR. SWAIN inquired how Dr. Hays decides what is a relaxed drum, and what class of cases he chooses for this treatment. As had most of the other men, he had also read Mr. Heath's paper after a great deal of application, for he was interested to learn what could be done to improve this condition, because when paracusis appears one can generally do very little to relieve the deafness. Furthermore, one of his patients had heard of this treatment, and had urged him to try it. So he selected three cases that had very definite paracusis—which he believed was Mr. Heath's criterion, though he understood that Dr. Hays used it in other instances. These cases had been treated by all the usual methods—the adhesions around the eustachian tube had been removed, the eustachian tube

dilated and blown up ad infinitum, and all the results possible had been obtained from these measures. They desired to try this Heath method. In all three cases there was some improvement, though the change was not very great. The patients are satisfied that they are improved, and are rather enthusiastic over the results. In two the noise has entirely disappeared in the ear treated, and he intends to give them further treatment if they desire it.

He could not, however, make himself believe that we have all been wrong all these years in all these cases, and that all the drums are relaxed in the cases that do not improve. In these three cases in which he had tried this treatment, the drums were not definitely relaxed, as he understood it—they were not concave and did not blow out too convex. They were not relaxed in the sense in which Dr. Hays spoke—at least they did not seem so—but they were paracoustic cases, and he felt justified in saying that they had improved somewhat under the treatment. In one instance the drum perforated and the hearing was much improved while the perforation lasted, being three or four times better than before. This case showed the best results of the three. Another case was that of a young woman of twenty-eight, who had had one ear benefited, and she now wishes to have the other ear treated.

Mr. Heath was the first who had ever explained to him the phenomenon of paracusis in logical sequence, though he did not feel sufficiently learned in this condition of the ear to understand all that he says about it or to know whether the premises were correctly taken. It is an interesting matter, and the method is original, and seems to offer some chance of results.

Dr. Swain hoped that Dr. Hays would be a little more explicit in defining the cases best suited for treatment.

Some of the older men may remember that a similar method of blistering was in vogue about 1886, and also a little later it was proposed to contract the drum by scar tissue produced by frequent incisions.

Dr. CRAIG said that Dr. Hays had spoken to him about this method of treatment about a year ago, at the New York Eye and Ear Infirmary. Since then he has treated three cases in this way. Two of them showed a distinct improvement in hearing, and one of them had a marked tinnitus which had disappeared; but the third case showed the most marked improve-

ment, which is the best argument for the treatment. This patient had been treated by excellent men, and every known method had been tried, but without relief. He had a relaxed ear drum, marked tinnitus and dizziness, and he had tried the usual methods for three months before undertaking this treatment, without any result. Last spring he had three months of this treatment, and was discharged in May, with the hearing and tinnitus better, and the dizziness gone. Previous to that, every known method of treatment had been tried, and this was employed as a last resort. The patient considered that it had done him a great deal of good. When seen last in September, he was in excellent condition. Dr. Craig said that he believed the method would do good in properly selected cases.

DR. DANZIGER said that one usually finds associated with this condition a connective tissue formation around the oval window. If one can get enough traction on the stapes to get relaxation of the adhesions, it might be that the treatment would be beneficial in that way, but he certainly could not see how that could come about. He believes that an acute inflammation might soften the connective tissue enough to allow more motion of the footplate of the stapes. But as soon as the inflammation subsides, contraction takes place again, and very likely will leave the ear in worse condition than before. In fact, the pathologic condition present is the result of a low grade inflammation.

DR. BRYANT said that he heartily concurred in what Dr. Hays had said about the efficacy of stimulation in chronic cases of deafness. Stimulation is the only efficacious way of dealing with these problematic cases. Dr. Hays' remarks about the use of the catheter were also just.

Dr. Bryant was not so enthusiastic about the Heath method of treatment as some of the other speakers. He modified his judgment of the method, however, by saying that the cases in which he had tried it were perhaps too far advanced and were not therefore a fair test. Dr. Bryant said he would certainly use the Heath method again if he had a case that did not respond to other treatment.

The difficulty he encountered in the method was the necessity of using very weak solutions on account of the thin cicatricial membranes. In spite of this precaution, after prolonged use without any visible reaction, the thin membrane

sometimes melted away. In his opinion the method does not stimulate in the membrane an effort to repair itself.

As to the Heath method of treatment, Dr. Bryant said that he could not report such good results as the other speakers. He had tried it with four very resistant cases, and had no beneficial result at all, though it might be that the cases were not quite a fair test, for the patients were extremely deaf, and from his point of view they were already hopeless. The results showed no improvement in hearing, but rather a slight decrease, if there was any change at all. They were not cases of relaxed ear drums in the sense used by Dr. Hays; but they were old atrophic cases, calcified and cicatrized, so they were not fair testimony against the method, and he would certainly try it again if he had a case that did not respond to other treatment. The difficulty he encountered was that he had to use very weak solutions on account of the thin cicatricial membranes. In spite of this precaution, after prolonged use without any visible reaction, the thin membrane melted away. There was no effort at repair at all.

Dr. DUEL said that his attention had been first called to this treatment by a paper received from Mr. Heath himself, and later he heard of it through a patient who had been in London and had received one of these pamphlets. She was a prominent woman and was very deaf, and had been treated by several otologists without any benefit. She had been unable to spend the time in London which was required by the treatment, and begged him to carry it out for her. He was about to undertake it, when he had a conversation with a surgeon who had worked side by side with Mr. Heath in the hospital with which he now had no connection. This surgeon had told him that he had been told of certain cases which had died as the result of the attempt to bring about this inflammatory condition in the ear; and that his reported results were discredited by many of the best men in London.

Dr. Duel said that he was not prepared to say that the results from tightening the ear drum by this inflammatory method were permanent, and he had no intention of discrediting Dr. Hays' report. He simply quoted what he had heard about Mr. Heath's work, and he hesitated about trying it himself on account of this direct report from a gentleman who had worked in the same hospital with Mr. Heath, and the fact that

the best men in London thought the method was not of sufficient value to induce them to undertake it. It would seem that there might be some danger in setting up an inflammatory reaction as violent as one would get from tincture of cantharides applied daily, particularly where there was any possibility of the presence of organisms in the middle ear. If one does undertake it, Dr. Hays' directions and his instructions to his patients in regard to the blowing of the nose, should be very carefully carried out.

Dr. Duel said that he himself preferred to wait a few years before trying the treatment.

DR. SEYMOUR OPPENHEIMER said that every one was much impressed a few years ago by the marvelous results which Mr. Heath had presumably obtained, and stimulated by that he himself had tried the treatment. In none of the cases in which he tried this treatment were the results beneficial. On the contrary, the patients were subjected to a treatment that was by no means pleasant, the inflammatory reactionary processes were extremely severe, and in all but one case a perforation resulted; in one case there was a severe inflammatory process in the external ear as well, and it was necessary to stop all treatment.

Dr. Oppenheimer said that he would not for a moment question the results obtained by Dr. Hays, and that there are some cases of relaxation of the ear drum where this painting process might do some good. Every one knows of the old practice of painting the ear drum with collodion, which, in occasional cases, proved beneficial.

DR. HAYS, in closing, said that his reasons for wishing to test the results of Mr. Heath's work were that he had been trying to do the same thing, but in a much more dangerous way, by the injection of irritating fluid into the middle ear. In the past two and a half years he has treated twenty cases, and in no instance has he had a perforation of the drum membrane. Many times there was an inflammation of the drum created, with a superficial epithelial scaling and discharge, but no perforation, and in no instance was the drum in a bad condition afterwards. The patient presented at the meeting had been treated with pure cantharides for nearly five weeks, and an examination showed a thickening of both drums, but no signs of perforation. At present she has a severe reaction

in the left ear, which probably will subside within twenty-four hours by cleaning the inflamed part and keeping it dry. She is at the stage now where it is wise to discontinue the treatment for two or three months. Once in a while a patient has a nasty blister. Just this morning one of his patients came to him from Philadelphia, where Dr. Hays had placed him in the hands of a competent man. This patient had a bulging drum on the left side, so large that it could be seen without a speculum. Apparently the physician who was treating him had not watched the reaction carefully, and therefore too strong an application had been made. Pricking the blister and wiping the parts dry was all that was necessary.

In reply to Dr. Danziger's remarks in regard to paracusis being due to adhesions, Dr. Hays said that as a rule this symptom is not due to adhesions, but to relaxation of the stapes. Dr. Hays does not believe that where there are strong adhesions anything can be accomplished by this treatment until the adhesions are broken up and the drum tightened.

Replying to Dr. Swain's question, as to what cases should have this treatment, Dr. Hays said that it is difficult to determine until one decides for himself what can be considered a relaxed ear drum. This can only be ascertained by noting the tension of every ear drum through an electric otoscope, and seeing what one would consider a relaxation. Dr. Hays said he hoped the questioners would give this treatment a fair trial, for there are many cases of deafness that are getting worse every year, after having been treated in some other way. If in these cases we find a relaxation of the drum, it is only fair to use a means such as this which is perfectly rational. Dr. Hays said he knew he had done no harm in any of the cases, and in some instances the results have been remarkable, but it is possible that these results are not permanent. One patient that came to him had had this treatment at the hands of another physician some few months before, with no result, and yet after four weeks' treatment, during which time the patient was watched and measured carefully, the hearing had improved by the watch test from zero to four and one-half inches. Patients are not likely to come back for treatment every day for five or six weeks, and then repeat the treatment, unless they feel that it is doing them some good.

Not every one who tries this treatment will meet with suc-

cess, and a certain amount of discredit will follow it, unless care is taken to try only suitable cases. The suggestion of paracutis is significant, and the paracutics respond the best. Moreover, the utmost care must be used in this treatment, for if too strong applications are made without varying the strengths of the applications, a complete destruction of the drum may take place. Moreover, making applications to a retracted drum which is bound down by adhesions, and in which there is no relaxation, is bound to result in severe destruction of the drum.

Report of a Case of Diphtheritic Infection of Both Ears Without Nasal or Throat Manifestations.

DR. WM. H. HASKIN: The patient, a man fifty-one years of age, came to the Manhattan Eye, Ear and Throat Hospital with a violent inflammation in the ear, and from the appearance and history it was thought to be a case of geniculate ganglion neurosis. The membrane was punctured, and in a few days he returned with a very peculiar white exudate on the drum membrane. Then he had pain in the other ear and a temperature of 101° , but the pain in the right ear (the first one affected) had practically disappeared. A paracentesis was performed upon the left ear, and a culture was taken from the right ear, the membrane of which was covered with the peculiar exudate. The first microscopic examination showed what was thought to be a pseudodiphtheria bacillus, but on trying it out biologically it proved to be true diphtheria. By the time the true diagnosis was reached both ears were absolutely cured. No antitoxin was given to the patient, for it was not known that he had the diphtheria until he was well. There was nothing abnormal in the nose, and no indication of the condition, yet here was a true diphtheria of both ears, one following the other, with an absolute biologic diagnosis, and the patient recovered without any antitoxin.

DISCUSSION.

DR. DUEL said that he, too, had been invited to discuss Dr. Thompson's paper, and had been interested in hearing the experience of others on this subject. He himself had had four cases occurring in private practice within fifteen days,

and with all possible diligence and caution had been unable to positively fix the source. He had attended the meeting of the New York Otological Society, feeling very blue about the matter, and found that a number of other men had had a similar experience, and as "misery loves company," he had been greatly relieved to learn that his own experience had not been unique.

DR. PERKINS said that about three years ago, in Dr. Dench's clinic at the New York Eye and Ear Infirmary, there were four cases, occurring in mastoid wounds. There was a sort of gray pellicle covering the wound, not very thick. In three of the cases the true diphtheria bacillus was found. About that time one of the assistants contracted diphtheria of the nasopharynx from working on these cases. The patients were not given antitoxin, but cleared up under applications of alcohol and bichlorid. In these cases there were no symptoms indicating systemic infection.

DR. HOLBROOK CURTIS said that he had had a similar experience, and had come to the meeting hoping to learn something more of the subject. About two weeks before, a patient had come to his office complaining of a discharge from the right nostril. He examined her and washed out the right antrum, obtaining a half teaspoonful of pus and some bloody membrane in flecks, and scales agglutinated in a way that he had not seen before in antrum cases. He had it examined, sending a smear and culture tube to the pathologist, who reported that he was very much surprised at the quantity of Klebs-Loeffler bacilli found in the culture. Another smear was taken and sent to the Presbyterian Hospital, and the same report was returned. It was undoubtedly the Klebs-Loeffler bacillus. Four days ago the patient's right mastoid antrum began to pain, and this was followed in two days by perforation of the drum membrane. Examination of a culture from the ear showed the same result. The cultivations all showed that they were rather attenuated, requiring twenty-four to thirty-six hours to grow, but all contained the Klebs-Loeffler bacillus. The patient was given antitoxin (three thousand units) four days ago, and has improved since. Dr. Curtis said that he had been wondering whether or not to follow up the injections, and would like to have the opinion of some of the members who had had similar experiences.

DR. ARD said that he had had one case of Klebs-Loeffler infection in the middle ear, followed by a double mastoiditis. In that case he had used antitoxin early, but without any appreciable effect. The process continued to operation. Recovery was uneventful, and in no way different from the usual cases. Eight or ten years ago he had had a series of cases (he thought five) within a very short time, where during the process of granulation and recovery after the mastoid operation there appeared a grayish membrane, quite thick, apparently infiltrating the granulation tissue. He was at a loss to account for it. The pathologist found a germ, but could not identify it. He had had no such experience before, and has had none since—possibly there was a Klebs-Loeffler infection which was not discovered. The treatment of these cases was similar to that mentioned by the other speaker, curetting, but the process of recovery was exceedingly slow, being prolonged for several weeks. One patient in a private room and separated by some distance from the other cases became infected and healing was prolonged.

DR. MULHOLLAND said that at the New York Foundling Hospital, on Dr. Kenefick's service, they had at the present time twelve cases of diphtheria of the middle and external ear, mostly unilateral. The patients are all children except one, and all show the Klebs-Loeffler bacillus. The average diphtheritic ear will clear up under treatment in two or three weeks, but some will persist for months.

DR. DOUGHERTY said that it was rather interesting to note how many cases of nasal diphtheria go unobserved. Some years ago he had had under his care in dispensary practice over a hundred cases of nasal diphtheria, which came for treatment merely complaining of a rhinitis or a slight epistaxis. Otherwise the patients were in an absolutely normal physical condition. They had no temperature, and were not in any way sick in appearance, only they had this nasal discharge. After wondering for a while at the prevalence of such cases, he began to take smears, and sent cultures to the Board of Health—something over a hundred of them—and in all cases there was a report of the presence of the true Klebs-Loeffler bacillus. Might not such cases as these, through continuity of tissue, explain some of the cases of middle ear conditions such as reported by Dr. Haskin and also Dr. Curtis' case?

DR. HASKIN, in closing the discussion, said he regretted very much that Dr. Thomson had not been able to attend the meeting and read his paper on Diphtheria and Pseudodiphtheria in Mastoid Cases, which he had been invited to discuss. He had intended in the remarks which he expected to make to call attention to some bacteriologic examinations of the ear which he and Dr. Dwyer had been making, and to ask the other men to give some attention to this subject and find out how prevalent this condition really is. He and Dr. Dwyer had had all the chronic cases in Dr. J. F. McKernon's clinic assigned to them for examination, and they had made smears and cultures which were carefully examined, and have treated the cases with autogenous vaccines. Looking over the cases which were capable of actual proof (there were twenty-eight cases in which the bacteria were isolated, and a number of mixed infections), there were seven cases in which the pseudodiphtheria bacillus was found. These had been thoroughly tested biologically, so there was no question of their being diphtheria. The condition is probably not uncommon, if carefully looked for.

NEW YORK ACADEMY OF MEDICINE,
SECTION ON OTOTOLOGY.

Meeting of February 14, 1914.

Cases Illustrating the Use of the Cotton Albolene Pledget for the Improvement of Hearing After the Radical Mastoid Operation.

DR. WESLEY C. BOWERS said that some time ago he had tried the effect of a cotton albolene pledget in the radical cavity, and found that it improved the hearing considerably. He had directed Dr. Dench's attention to the matter, and Dr. Dench had asked him to show these cases before the Triological Society, and later Dr. Voislowsky had asked him to present them before the Section. Every one is familiar with the use of cotton albolene pledgets in residual cases of chronic purulent otitis media. This has precisely the same effect, though the pledget is much larger, and the patients can be taught to make and put them in themselves. This device works best in that type of cavity which has been previously skin grafted. The cases presented were both previously skin grafted. Of course, where the fundus is filled up with granulations and fibrous tissue, the hearing is so poor that naturally the pledgets will be of no use.

The method of application is exactly the same as used in the radical chronic purulent types, excepting that a large instead of a small pledget is employed. Cotton is twisted upon the end of an applicator, flattened out into a mushroom-like top, removed from the applicator and cut off close to the top; the top is then dipped in albolene and by means of a pair of forceps it is inserted into the ear over the oval window.

Before the operation the girl heard at two inches on the right side; after the operation she heard at six inches, and with the pledget she heard at eighteen feet. The boy heard at four inches before operation; at six inches after operation; and with the pledget he heard at twenty feet. The best results were obtained with a private patient. This patient heard at

two inches in the right ear, and with the pledget heard at over twenty-three feet.

As for how long the pledget should remain in, it is pretty hard to say. The boy has had the pledget in for a month, and his hearing remains the same; the girl changes hers every day; she claims that the pledget gets out of place. The pledget seems to have no deleterious effect on the cavity, and no ill effects have been noticed in any of the cases. A discharge was present for a year, in the case of the girl, in her left ear; there was excoriation over the inner wall, floor and facial ridge. With the use of the pledget, it has completely dermatized over, and the ear is now perfectly dry. In the right ear the tube is still open and the pledget has caused no trouble. She has been using the pledget for six weeks.

Dr. Bowers said that he had used these pledgets in nine cases, and they worked well in eight of the nine. The ninth case heard so poorly that it was difficult to tell whether the patient heard at all with that ear or was depending entirely upon the other side. He could not be tested with the noise apparatus. There seems to be no question but that the hearing is benefited, and the device is well worth a trial. The great objection to the radical mastoid operation is the resulting injury to the hearing, and this pledget has been proved to be very helpful to these cases.

DISCUSSION.

Dr. DANZIGER asked how long after the operation these results were obtained. Usually, for a month or so after the operation, the hearing is poor, but improves when contraction has occurred.

Dr. BOWERS replied that the right ear was dry and the pledget was tried seven months after operation. In the left ear it was introduced six months after operation.

Dr. VOISLAWSKY said that every one was familiar with the use of pledgets in cases of chronic suppuration, but that he had never heard of using them after the radical operation.

Dr. KERRISON said that it was a most interesting suggestion, and asked that Dr. Bowers show how the pledgets were made, and the size employed.

Dr. BOWERS demonstrated the making and application of the pledget. The patient can tell instantly as soon as the pledget strikes the right place.

Paper: The Diagnosis of Endocranial Complications.*

By ALFRED BRAUN, M. D., AND ISIDORE FRIESNER, M. D.

DISCUSSION.

DR. RICHARDS: Every one who has had clinical experience with suppuration of the labyrinth has been impressed with the fact that, so far as its complications are concerned, purulent meningitis ranks first, not only in frequency, but in importance. In cases of simple mastoiditis, meningitis does not arise as a relatively frequent intracranial complication. Speaking from my own experience, I should place, in the order of frequency, epidural abscess first; sinus thrombosis second; meningitis third; and brain abscess last. Of the intracranial complications of the suppurating labyrinth, however, meningitis stands preeminently first. The question naturally arises: Why this frequency, and to what particular relations is it due, and what are the factors influencing it? It is in this connection that I shall discuss certain clinical observations which may be of interest, particularly as they relate to the modiolus as an avenue of infection.

In one of the earlier cases of suppuration of the labyrinth which I operated upon, while removing the modiolus from the apex toward the base, to secure a complete exposure of the cochlea, I noticed a seepage of cerebrospinal fluid from the modiolus stump. The modiolus stump in this case was in no way fractured, yet the intracranial and operative cavities had been placed in direct communication. It was evident that the numerous canals traversing the modiolus from base to apex were not completely filled by the structures which they contained, and that the cerebrospinal fluid in consequence penetrated out into the modiolus—that is, grossly—to a greater or less distance. Nothing could better illustrate the intimate relation between the labyrinth and the intracranial cavities, and the ease with which an infective agent involving the fluid of the one may gain access to the other, producing a purulent affection of the entire cerebrospinal fluid column and the adjacent membranes. We also see that opening the labyrinth may, in a surgical sense, be the equivalent of opening the subdural space; and our attitude towards an infected

*See page 9, March, 1914, *Annals*.

labyrinth must be influenced by this simple clinical observation. It shows where a slow and gradual interchange between the fluids of the two cavities may occur.

A second point to which I wish to call attention is this: In those cases where we have either accidentally or intentionally removed the modiolus in its entirety, there is apt to occur a marked loss of cerebrospinal fluid. This outpouring may fill the operative cavity several times in a very brief interval. As the fluid gradually lessens, there comes a time when its escape ceases and the fluid merely fills the lumen of the meatus, maintaining an equilibrium. Now, if we chance to dress the case at such a time, we are enabled to observe the influence which respiration exerts upon the cerebrospinal fluid column, as indicated by the fluid's movement within the meatus, and we notice an ebb and flow, or a rise and fall, in the fluid. When we consider this effect which respiration has upon the cerebrospinal fluid column, in conjunction with the very intimate relation existing between the labyrinth and the intracranial cavities, as already mentioned, we see that this also may be an important factor in the spread of infection between the two; moreover, it indicates how the labyrinth fluid may be replenished and kept in a constant state of interchange.

A third reason suggests itself as to why in a suppurating labyrinth meningitis is a relatively more frequent complication than, for instance, epidural abscess. If one removes the calvarium and attempts to strip the dura from the floor of the skull, two areas will be found which are particularly resistant to the stripping. One of these is the petrous pyramid, the other is the floor of the anterior fossa of the skull around the cribriform plate of the ethmoid. In each locality the surface of the bone presents numerous irregularities for the close attachment of the dura. Now, it is seldom that we find clinically a collection of epidural pus at the floor of the anterior fossa arising from ethmoiditis, as compared to the frequency with which meningitis follows the affection of the nasal sinuses. It is also seldom that we find clinically a collection of epidural pus at the posterior petrous plane situated far in around the internal meatus, the reason being in each case the same, that is (aside from other factors which every one recognizes to exist), it is physically difficult for a collection of

epidural pus to form in either locally where the dura is so intimately adherent to the adjacent bone. It presupposes that the pus shall collect under excessive tension, and with this factor of excessive tension given, it is notorious that infection tends to spread along whatever avenues it may, and not to confine itself; and so it is that meningitis is more apt to occur than an epidural collection of pus. While we recognize that collections of epidural pus at the outer portion of the posterior petrous plane are not uncommon, such collections in and about the internal auditory meatus are rare. I have observed it twice in about thirty labyrinth cases.

Another factor I should like to mention: When for any reason we injure the dura over the anterior cerebellar aspect, particularly in the region of the internal meatus, we are often confronted with a flow of cerebrospinal fluid which continues intermittently for weeks. Such an injury to the temporosphenoidal bone is accompanied by no such results. Why the difference?

When the dura of the temporosphenoidal lobe is injured, the brain mass protrudes as a bud of encephalon into the dural opening and shuts off the subdural space, and the subdural space remains shut off. This is not always the case in a corresponding injury to the cerebellar dura. Here we may see a protrusion of the encephalon into the opening temporarily, only to have it forced away later by the accumulation of cerebrospinal fluid in the cerebellar fossa, and this is the more liable to occur the nearer the injury to the internal meatus; for in the area referred to, the cerebellar fossa contains a relatively large quantity of fluid which cushions the cerebellar mass more effectively from its internal dorsal surface than is the temporosphenoidal lobe cushioned from its opposing dural surface. It is easier, therefore, for an abscess stalk to form through inflammatory adhesion between the dura and the temporosphenoidal lobe than between the dura and the cerebellar lobe. This is a factor which has some bearing upon the relative infrequency of cerebellar as compared to temporosphenoidal abscess, and also upon the relative frequency with which meningitis primarily invades the posterior fossa; for in the latter, while the cushion of fluid protects the cerebellar mass, it itself, starting in direct relation to the internal meatus and the modiolus, which are great avenues

of infection, consequently occupies a vulnerable position.

Dr. Richards said that he was very glad to have heard the paper, as it was a most practical presentation of the subject.

Dr. KERRISON said that the differential points given by Dr. Braun between suppurative labyrinthitis and cerebellar abscess were most important, since one who is not familiar with them might easily fall into serious error. As a matter of fact, however, there is not usually much difficulty in recognizing a cerebellar abscess secondary to labyrinthitis, i. e., providing that characteristic focal symptoms are present. The onset of a suppurative labyrinthitis and some cases of cerebellar abscess present certain points in common, in that in each condition nystagmus, vertigo and disturbance of static equilibrium are present. There are, however, certain differences which these phenomena present, as they result from one or other of these lesions, which easily distinguish them. For example, the nystagmus of acute suppurative labyrinthitis is constantly in one direction—i. e., in the direction of the sound ear—is increased when the eyes are voluntarily rotated in the direction of the quick eye movement, and is diminished when they are turned in the opposite direction. The direction of the patient's falling tendency bears a constant and invariable relation to the nystagmus and the position of the patient's head. In cerebellar abscess, on the other hand, the nystagmus changes its direction frequently, i. e., with movement of the head, changes in the position of the eyes, etc. Again, the direction of falling often shows no relation to the nystagmus. The nystagmus becomes rapidly and progressively less marked in labyrinthitis, and persists or increases in cerebellar abscess.

If we could imagine the simultaneous or coincident development of a cerebellar abscess and suppurative labyrinthitis, the interpretation of the combined symptoms might present great difficulties. It is difficult to believe, however, that a cerebellar abscess secondary to suppurative labyrinthitis could develop until long after the symptoms of vestibular irritation had completely disappeared; so that the two lesions, though presenting superficial similarities, should not be difficult to differentiate.

Dr. Kerrison said that the real problem with which we have to deal in suppurative labyrinthitis was that to which

Dr. Richards had devoted his remarks, viz., meningitis. Unlike cerebellar abscess, meningitis may develop at any stage of a labyrinthine infection. How are we to recognize the earliest phase of a meningeal infection occurring during the acute stage of a suppurative labyrinthitis? In other words, how are we to interpret definitely and correctly the meningeal lesion, before it has passed beyond the stage in which surgical treatment may be of value? That is the urgent problem which every practical otologist associates with suppurative labyrinthitis, and it is a problem which has not yet been solved.

In regard to the fistula test, to which passing allusion had been made, Dr. Kerrison said that he thought it should be recognized that this test may involve certain dangers of its own. Dr. Braun had mentioned the auditory and vestibular nerve tracts as among the pathways of infection to the meninges. Dr. Friesner had described the modiolus as having under the microscope the appearance of a sponge. If we imagine a defect (fistula) in the labyrinthine capsule, and the labyrinthine spaces as containing pus, it is surely a reasonable possibility that forcing air into the labyrinth may propel infective matter along pathways leading to important intracranial structures, with the subsequent development of serious intracranial infection.

DR. GEORGE E. DAVIS said that, in the initial stages, a differential diagnosis is not always easy, between an acute suppurative labyrinthitis and a complicating meningitis; particularly if the labyrinth is infected during an attack of acute mastoiditis. In labyrinthitis, aside from the characteristic syndrome or triad—nystagmus, vertigo and ataxia—there may be severe headache, referred to the occiput or vertex, associated with nausea, vomiting and high fever. The latter symptoms, if continuing for more than a day or two, would cause apprehension of a complicating meningeal infection. However, as the labyrinthitis may be responsible for all these symptoms, and as the initial signs of meningitis are by no means uniform or pathognomonic, the element of time is an important role in the differentiation, and we are compelled to adopt the policy of watchful waiting for a brief period. Some authorities question the possibility of labyrinthitis, alone, producing severe headache, and attribute this phenom-

enon, when it is present, to the associated mastoiditis or meningitis. However, I believe that labyrinthitis, alone, may be responsible for this symptom, and in this opinion I am supported by such authorities as Kerrison and other writers.

DR. FRIESNER expressed himself as being much gratified with the discussion evoked by the paper. There is no question but that meningitis is by far the most frequent complication of labyrinthitis. This fact has been observed, clinically, only since functional tests of the labyrinth have been made regularly, but it was observed pathologically long before that. In the days when he was a medical student, he frequently heard urged as a deterrent for the performance of the radical mastoid operation, the frequency with which it was followed by meningitis, with no apparent reason. These cases were intracranial extensions from chronic latent suppurative labyrinthitis. The labyrinthine disease was not recognized.

Histologic examinations support Dr. Richards' statement with regard to the broad lymph channels of communication between the labyrinthine spaces and the subdural spaces. The modiolus in the human temporal bone looks like a sponge. It is full of holes, and unquestionably these holes are lymph spaces, so that a series of very broad avenues of communication exist, between the labyrinthine spaces and the subdural spaces, through the internal auditory canal. Then there is a direct avenue of communication, which is second in importance as a pathway of infection, and that is the aqueduct of cochlea.

Dr. Friesner said that he had not before thought of the effect that respiration must have in sucking infection, as it were, from the labyrinth, through the lymph spaces, into the meninges. Undoubtedly the most important reason why meningitis occurs so frequently is that there is no opportunity for the process to become walled off. Peculiar pathologic conditions within the labyrinth also seem to prove this. It is a very common thing to have a tuberculous invasion of the labyrinth, and yet tuberculous middle ear disease rarely leads to meningitis, through the labyrinth.

With regard to the fact that the dura is particularly adherent to the posterior petrosal wall, anyone who has done much work in the dead-house can readily subscribe to that observation. The posterior petrosal wall is full of pits and of

irregularities, and the dura has a way of being tucked into these pits, so that it is difficult to strip it off without tearing it. It does not seem certain, however, that this favors a meningitis. Where the dura is readily stripped, it seems that the avenues of communication, so far as the lymph channels are concerned, are very much more numerous. We know how the dura is stripped from the cranial bones of children, and that, in such dura, the lymph channels are richer than in adults. Dr. Friesner said that he has a specimen which shows an extension of a suppurative labyrinthitis through the dura, covering the posterior petrosal wall. He also has the cerebellum of this case, which shows an abscess cavity which is in contact with the posterior petrosal wall. In this instance it would seem that the fact that the dura was so adherent, favored a slow perforation and the formation of a cerebellar abscess, rather than a diffuse meningitis.

Neumann, in his book on cerebellar abscess, states that it is associated with labyrinthitis in sixty per cent of the cases. Dr. Friesner said that he had been intending to look over the statistics, since the time functional tests were regularly made, in all chronic suppurative cases that had come to operation. It was his impression that cerebellar abscess is associated with a greater percentage of dead labyrinths than sixty per cent.

Dr. Kerrison seemed to think that the differential diagnosis between cerebellar abscess and acute suppurative labyrinthitis presented few difficulties. Dr. Friesner said that he could not agree with Dr. Kerrison on this point. It does present difficulties. Of course, a typical case of manifest labyrinthitis cannot be confused with a cerebellar abscess; but given a dead labyrinth, it is difficult at times to determine whether it exists alone, or is associated with cerebellar abscess. Sometimes these patients are brought to the hospital comatose, and no history can be obtained. In the Transactions of the German Otological Association of 1911, Dr. Bárány describes such a case.

Dr. Friesner said that he did not believe, with the knowledge that a cerebellar abscess occurs so frequently in the presence of a dead labyrinth, that the differential diagnosis between a labyrinthitis alone and one complicated with a cerebellar abscess was an easy task.

We know that functional tests of the static labyrinth arouse

stimuli of various strength, the weakest being the caloric test. That is destroyed almost as soon as the hearing. Hearing is the most easily destroyed labyrinthine function. Where there is a diffuse labyrinthitis, secondary to a circumscribed labyrinthitis, the fistula test is the last to disappear. He had previously heard of the danger of the fistula test. If the fistula test is considered mechanically for a moment, one must believe that the portion of the endolabyrinthine wall which is most affected by disease is that in the fistula. As a matter of fact, as soon as compression is made, that wall collapses—possibly there is less pressure made there than on any other portion.

Another reason for the belief that there is little danger in the fistula test is that, although he has read the literature of labyrinthitis carefully for years, he had found no mention made of such danger in any of the cases reported. He could not recall ever having heard of a case of diffuse labyrinthitis following that test. While no one would use it unnecessarily, there does not seem to be any considerable danger attending it.

Referring to Dr. Davis' remarks, Dr. Friesner said that there is very frequently pain with labyrinthitis—not because of the labyrinthitis, but because an acute diffuse labyrinthitis is so often associated with an exacerbation of a chronic middle ear suppuration and an acute mastoiditis. The patients can have some headache from the persistent vomiting caused by the labyrinthitis, but they do not have the severe headache of meningitis. Moreover, it has been shown that all forms of labyrinthitis may exist without a rise of temperature. A labyrinthitis, even a diffuse suppurative labyrinthitis, does not cause a high temperature, and whenever there is a temperature of 102° or more, with headache, the chances are that we are dealing with a meningitis.

DR. BRAUN said that as ordinarily made, with the Politzer bag in the external auditory canal, he had never seen any harm follow the use of the fistula test; but in two cases, in which a radical mastoid operation was done, where the fistula test was demonstrated by touching the fistulous area in the horizontal semicircular canal repeatedly with gauze or a probe, he saw a diffuse serous labyrinthitis follow.

NEW YORK OTOLOGICAL SOCIETY.

Stated Meeting, November 25, 1913.

DR. ROBERT LEWIS, PRESIDENT, IN THE CHAIR.

Ridge Forceps With Cutting Edge Turned in Opposite Direction.

DR. STEPHEN H. LUTZ, of Brooklyn, presented an instrument which was like his ridge forceps, only turned the opposite way from the usual. He had found it difficult in a number of cases to get far enough upward and forward with any other instrument, and decided it would be feasible to simply turn the cutting edge of the ridge forceps in the opposite direction. He had this done, and found that it worked very well.

Punch of a New Pattern.

DR. LUTZ also showed a sphenoid punch of a new pattern. This is similar to the Faraci punch for removing the anterior wall of the attic. The instrument is strong though small, and can be introduced into any small opening.

DISCUSSION.

DR. ARTHUR B. DUEL had long felt the need of a punch by means of which one might cut from behind forward in work on the nasal septum, and if Dr. Lutz had devised such an instrument he had filled a patent need.

Adenoid Removed From a Child Three and One-half Years Old.

DR. ROBERT LEWIS presented a specimen of an adenoid measuring three and one-half inches in length by one-quarter of an inch in thickness by three-quarters of an inch in width. It was removed from a child three and a half years of age, a rosy-cheeked little one, who had no difficulty in breathing through his nose. It was removed with a Gottstein curette. The tonsils were enlarged, but not unusually so.

Two Cases of Mastoiditis in Which the Streptococcus Capsulatus Mucosus Was Found.

DR. EMIL GRUENING detailed two cases of mastoiditis in which the streptococcus capsulatus mucosus was found.

The first case, a woman forty-five years of age, from

another state, became ill at the hotel. He had seen her ten years before, at which time she had chronic aural catarrh, but no inflammatory process. On the present occasion she had been ill for two days when he was called to see her. He found the mastoid of one side tender, very little discharge from the ear, and a temperature of 101.4° F. The drum was incised and the streptococcus capsulatus mucosus found. Inasmuch as the mastoids were very large, as there was only slight tenderness on one side, and as there was a very slight degree of elevation of temperature, X-ray pictures were taken of both mastoids. Large pneumatic cells were found on each side. On one side all were clear; on the other they were dark. All the cells of one side at the apex were filled with pus, as were likewise those over the sinus and in the zygomatic process. All this was read from the X-ray plate. The patient was operated upon on the 7th of October, the fifth day after the onset of the disease. The exact conditions represented by the X-ray were found. The septa separating the cells were already broken up. The entire field was cleared out completely, and no recurrence had taken place.

In the second case he was called in on Friday. The mastoid was exceedingly tender, and there was a slight elevation of temperature—101.5° F. The patient, a German, felt very weak, and was sent to the New York Eye and Ear Infirmary for operation. Upon opening the mastoid on the affected side the streptococcus capsulatus mucosus was found. Every small cell of the mastoid was cleared out completely, even cells under the facial ridge. It was a complete operation. The patient recovered, and three weeks after the operation there was no pain and no temperature.

By immediate and thorough operation as good results could be obtained in mastoiditis due to streptococcus capsulatus mucosus infection as in any other variety. German otologists were devoting considerable attention to this class of cases.

DISCUSSION.

DR. WILLIAM H. HASKIN mentioned, in this connection, a paper read before the Section on Medicine of the Academy of Medicine in November, 1913. In this paper, Rosenau reported the results of his researches and showed pretty con-

clusively that the streptococcus pyogenes, the pneumococcus, the streptococcus mucosus capsulatus, and all the various streptococcus varieties, such as that associated with rheumatism, and the streptococcus viridans, the streptococcus found so often in endocarditis, were one and all transmutable the one into the other—thus by growing a pneumococcus on special media and under special conditions, he could change it into the streptococcus, and vice versa. The thing for us to remember, as clinicians, is the fact that it is the possession of a capsule that adds so much to the virulency of an organism—that the capsule confers great power of resistance to the organism possessing it, and it is in all probability to the possession of a very thick capsule that we must attribute the great virulency of the streptococcus mucosus capsulatus. This organism morphologically resembles the streptococcus in that it appears in chain formation, but the points of similarity end there, as the organism biologically is more like the pneumococcus in its possession of a capsule and in its serum reactions. We must, therefore, be careful not to single out the mucosus capsulatus by itself, but be especially careful where we have to deal with any organism possessing a resistant capsule, bearing in mind that this capsule protects the organism from the phagocytic and other defenses of the body, and therefore is all the more to be feared.

DR. ROBERT LEWIS said this point had been brought out in a discussion at a recent meeting of the Hospital Graduates' Club, when Dr. Dixon said that in cases where the streptococcus capsulatus mucosus was found the area of necrosis was much more extensive after a short interval of invasion than in cases where other forms of streptococci were present, and the physical signs of a mastoiditis were, as a rule, absent or not well marked.

DR. E. B. DENCH recalled having reported, six or seven years ago, a series of thirteen cases of streptococcus capsulatus mucosus infection of the middle ear. All were treated by means of free drainage, only two of the cases coming to operation.

If streptococcus mucosus infection were drained early and thoroughly, the results would be no different from those obtained in any other variety. He recalled a case in which the drum membrane was incised on the fifth day after the incep-

tion of the symptoms. There was then a little mastoid tenderness. The symptoms cleared up completely. The patient was a man over sixty years of age, whose other ear was practically useless in consequence of a previous infection. In every case which cleared up under incision of the drum membrane the patient remained well. He agreed with Dr. Gruening and Dr. Dixon that extreme care should be exercised in these cases, but he did not believe that in the presence of this organism one should proceed at once to operate. With reference to X-ray plates, he said that for three or four years Dr. Dixon, in numbers of cases, had pointed out localized infections which had been demonstrated upon operation.

DR. STEPHEN H. LUTZ cited two cases in young children in which streptococcus capsulatus mucosus infection was entirely checked by simple drainage. In one case in which he had operated upon the mastoid of the opposite side two years before, the child's father, a physician, did not want a second operation, so the ear was drained. Results had been less satisfactory in several other cases, because the patients were not seen until several days after the onset of the disease. He emphasized the importance of instituting treatment early.

DR. HASKIN referred to a series of eight cases from the clinic of Dr. McKernon, treated by means of autogenous vaccines. Three of these were streptococcus infection, and for personal reasons the patients refused operation. After treatment without vaccines for from four to eight weeks, with no success in checking the discharge from the ear, autogenous vaccines made by Dr. Dwyer were employed. In the one case there was a perforation through the posterior canal wall, the ear was discharging profusely, and there was intense pain. In the three cases the streptococcus infection cleared up with the use of the vaccines, with no return whatever. Several cases of staphylococcus infection, and one of bacillus proteus vulgaris, cleared up under the use of autogenous vaccines. He had tried the vaccines four or five years ago, but owing to poor technic there was such a mixture of bacteria in the canal of the ear no vaccine could be made. Last winter he tried the plan of making the canal perfectly sterile with alcohol before getting the smear, then using the otoscope, drawing the secretion down from the deeper recesses of the ear, and making the vaccine from this. He emphasized the

necessity for isolating the bacterium which causes trouble in a given case, and making a vaccine from this.

DR. ARTHUR B. DUEL thought the discussion was wandering from the important point in the cases cited. Dr. Gruening had emphasized the importance of the radiograph as a means of indicating the necessity of early operation in certain cases of streptococcus mucosus infection. An X-ray picture should be taken in every such case, and if, as in Dr. Gruening's cases, a mass of pus was found, operative interference should be instituted at once, regardless of the clinical findings.

DR. WENDELL C. PHILLIPS cited the case of a strong and otherwise healthy woman who gave a history of a very sudden onset, with pain so severe that she went to his office at four o'clock in the morning. She was sent to the hospital for operation. The report from the blood culture was streptococcus capsulatus mucosus. The temperature was 103° F., and there was mastoid tenderness. Operation was deferred, and after two days the symptoms cleared up perfectly. He did not advocate, as a usual thing, this plan of procedure, but in this case the symptoms cleared up without operation.

DR. GRUENING, in closing the discussion, said the mastoid is not usually very tender in streptococcus capsulatus mucosus infection. The tendency is not for this to perforate the drum membrane, but to extend toward the brain. In the papers by Siebenmann and others, it has been found that there is a tendency to mastoid involvement, with very rapid destruction. All these authors agree that the organism under consideration is the most dangerous of the streptococci. He maintained that whether these germs are or are not identical as to culture, they are certainly different clinically. In some cases, if operation had been performed on the sixth day, the patient would have died. In the case which Dr. Whiting reported there was a similar process. The streptococcus capsulatus mucosus has quite a different action upon the bone. The drum membrane may heal and the process become latent. In the German literature there was a consensus of opinion in regard to the streptococcus mucosus. The two cases reported bore out the German view. In both his cases there was spontaneous perforation; one should not wait for this, however, but should make the perforation and make it large.

Case of Right Temporosphenoidal Abscess.

DR. ARTHUR B. DUEL reported a case of right temporosphenoidal abscess in a female patient who appeared at his clinic at the Manhattan Eye and Ear Hospital nine months ago. She was sent immediately to the operating room with a diagnosis of mastoiditis and large subtemporal abscess. The abscess was found upon operation to contain about an ounce of pus; the mastoid was necrotic and filled with pus and granulations. After cleaning it out a fine line of pus was discovered extending from the dehiscence in the inner plate in the temporosphenoidal region. On removal of the inner plate over mastoid antrum and attic a "stalk" was discovered leading to an abscess in the temporosphenoidal lobe. A few layers of rubber tissue were passed through this into the abscess, great care being used to avoid injury of surrounding healthy tissues. Recovery was uneventful.

DISCUSSION.

DR. GRUENING said the patient, as a rule, does not complain of blindness, the vision generally remaining good. He asked if the cases recovered.

DR. T. PASSMORE BERENS recalled a case of brain abscess in an epileptiform subject. The patient came to his clinic at the New York Polyclinic Medical School and Hospital several years ago, and was suffering from a profuse discharge from the ear, which he claimed to have had since childhood. Dr. Berens performed the Schwartz-Stacke operation, and in doing so exposed a small fistula which was discharging pus through the dura into the region of the tegmen. Operation laid bare a large abscess in the temporosphenoidal lobe. Recovery from operation was very rapid, and the patient was free from epilepsy for a number of months. At no time were there any eye symptoms.

Thrombosis of the Lateral Sinus Cured Without Operation.

DR. JAMES F. MCKERNON reported thrombosis of the lateral sinus cured without operation in two cases. One case, first seen on April 16th, at about four o'clock in the afternoon, gave a history of discharge from the right ear for nine weeks. Upon examination pus was found in the external auditory canal; the lumen of the canal was obstructed by a

general infiltration, extending to the meatus. The patient was taken to the hospital and operated upon that night. It proved to be one of the most extensive mastoids he had ever seen, extending almost back to the occipital articulation. The inner table was found necrotic over the roof of the antrum and floor of the middle fossa, and the sinus was uncovered for more than an inch posterior to the knee, to a point entering the bulb below. At this time the blood current seemed to be normal. The boy was placed in bed, with a temperature ranging from 100 to 102° F. The left ear had also been discharging for three weeks. On the fifth day the temperature rose to 104.5° F. Examination of the left ear showed the drainage obstructed, with marked prolapse of the drum membrane over the whole area. The left mastoid was operated upon that afternoon. The patient did indifferently for about five days, with a temperature ranging from 98.5 to 102° F. Suddenly he had a chill, with propulsive vomiting. The temperature rose to 106.4° F., rectal temperature in the afternoon being 105.4°. Believing the sinus to be involved, he advised immediate operation, but this the father positively refused to allow. He saw the father at the hospital at eight o'clock the next morning. Operation was still refused. The father was told that if he would assume all responsibility the child would be kept under observation and treated without operation. A blood culture was taken; one hundred and five colonies to the slide of streptococci were present. The child had another chill, and the temperature, which had dropped to 102 degrees, rose again to 106.6° F. The father again refused operation. Another blood culture was made. This showed ninety-four colonies to the slide. Streptococci viridens were then isolated, and a serum made therefrom. This required twenty-four hours. In the meantime the child had two rises of temperature, the first to 104.2, the second to 106.4° F. The usual dose of the serum was 100 millions, but in this case an injection of 150 millions was made. This seemed to have no effect. The temperature rose again in the evening, there was nausea and vomiting. The first dose was given at two o'clock in the afternoon, and at ten that night 500 millions more were given. After this the child improved, making a steady recovery. Judging from the physical signs, the sinus was unquestionably plugged with a clot. The num-

ber of injections given was six, the dosage being 500 millions daily after the first twenty-four hours.

In another case, a boy, there was streptococcus capsulatus mucosus infection three days after mastoid operation. The bone involvement was not so extensive as in the first case, nor was the vomiting so pronounced. Blood culture gave eighty colonies to the slide of the streptococcus capsulatus mucosus. The bacteriologist advised a mixed vaccine in this case. Six injections were used, one each day, and the child made a perfect recovery. The sinus was not opened, but there was sufficient clinical evidence to warrant the diagnosis of sinus involvement.

DISCUSSION.

DR. WENDELL C. PHILLIPS said the statements made by Dr. McKernon bore out his own findings in the dead-house and in clinical experience, to the effect that spontaneous recovery in these cases takes place. He expressed himself as being not very enthusiastic about the vaccine treatment. He would have to see a large number of cases before he would be convinced that any of the cases reported would not have recovered without the vaccines.

DR. MCKERNON, in closing the discussion, said he did not wish to be misunderstood with reference to the cases cited. He believed in the usual procedure of evacuating the sinus contents, but in some cases in which operation could not be performed, on account of the condition of the patient, or because operation is refused, it was necessary to resort to other measures. He agreed with Dr. Dench with reference to reporting cases in which vaccines are employed. He also recognized the fact that in some cases of lateral sinus thrombosis spontaneous cure may take place. He did not advocate the use of vaccine except in cases in which operation is contraindicated or refused.

Mastoiditis of the Streptococcus Capsulatus Mucosus Variety Treated With Hiss Leucocyte Extract.

DR. WILLIAM H. HASKIN reported a case of mastoiditis, of the streptococcus mucosus variety, treated with Hiss leucocyte extract. There was mastoid tenderness at first, but this soon subsided. The temperature ran around 105° F. for five days,

and a positive bacteremia was found, when it was discovered that the patient, a child, had acute endocarditis. An infarct then developed in the right groin. Dr. Phillips and Dr. Rae both saw the patient, and agreed that on account of the desperate condition of the child, who was in a state of true sepsis, operation was not advisable. Colonies of streptococcus capsulatus mucosus were so numerous in the blood cultures that it was almost impossible to count them. The child was given 10 cc. every day of Hiss leucocyte extract. Five days after the first blood culture another was taken, and this proved absolutely negative. The symptoms improved, and a week later another culture was made in order to be sure that there was no bacteremia. A week later still another culture was made. The patient now laid in the typical position of hip joint disease. Dr. Berg, of Mt. Sinai Hospital, who was now called in, thought there was an infarct in the hip joint. X-ray gave no evidence of pus. The child was kept in the hospital for a month. He was then sent to the New York Hospital and the swelling in the right groin operated upon. A walled-off abscess was found, with about two ounces of pus. When he saw the patient at the Manhattan Eye and Ear Hospital about two weeks ago, seven months after treatment, he was wearing a brace. He was otherwise perfectly well. The only treatment was the administration of the Hiss leucocyte extract, and its effect was truly remarkable.

DISCUSSION.

DR. ARTHUR B. DUEL called attention to the very different remedies for the same condition. Dr. McKernon gave an autogenous vaccine in one case and a stock vaccine in another, and both recovered. If recovery was the result of the action of the vaccine in these cases, it must be attributed to the stimulation of production of antibodies within the system; in other words, within the patient's own laboratory. Dr. Haskin's cases, on the other hand, if they were cured by Hiss serum, were cured by the introduction into the system of a substance manufactured in an outside laboratory, which in itself was an antidote to the poison apparently overwhelming the patient. There was no analogy between the cases other than that they both illustrated an important fact, viz., that all hope need not be abandoned when cases were doing badly,

even after the best effort had been made to localize or eliminate the source of infection, or in rare instances where no such effort had been made for some good reason. Stimulation of the flagging energies of the patient's own laboratories, on the one hand, or introduction of aids from outside laboratories, on the other hand, might prove efficacious.

DR. EDWARD B. DENCH agreed with Dr. Phillips that a certain proportion of these cases recovered spontaneously. He thought cases treated with vaccines should not be published until the method had been thoroughly tested. The general run of practitioners take too kindly to the vaccine treatment as a substitute for operative interference, and for this reason he thought it ill advised for such reports to get into the literature. The report of such cases in camera, however, was quite permissible, as looking to a solution of the question of the value of the vaccine treatment.

DR. ROBERT LEWIS recalled a case seen by him fifteen years ago, in which there was no bacteriologic examination. He performed a double mastoid operation, which was followed by a sudden rise of temperature, with a chill. Dr. Whiting and others were called in consultation, and the diagnosis of lateral sinus thrombosis was made. For thirteen days the child had a temperature ranging from 96 to 106° F. Nothing was done except to keep the mastoid wound clean. Perfect recovery resulted.

DR. WILLIAM C. BRAISLIN said he had in his possession a specimen of an obliterated sigmoid sinus which had not been operated upon, but which had healed spontaneously years before the patient came under his observation for mastoiditis and sinus disease of the opposite side.

At autopsy, this obliterated sinus was found on the side which presented no symptoms during the time the patient was under the observation of the reporter.

DR. J. E. SHEPPARD, of Brooklyn, apropos of the readiness of the profession to use the vaccines, cited the case of a man who consulted him, two weeks previously, for chronic middle ear suppuration. During the three weeks previous to this he had had five injections of vaccine, which had been attended by constantly increasing headache and mastoid tenderness. The physician who gave the vaccines told the patient he would be all right if he would continue a while longer. Within two

hours after the speaker was consulted the patient was operated. The condition was so far advanced that he did not dare to do more than the Schwartze part of the radical operation. A few days later he proceeded to complete the radical mastoid operation. This was followed by complete recovery.

Fracture of the Bony Meatus.

DR. PHILIP D. KERRISON reported a case recently seen by him at the Polyclinic Hospital, in which the patient, a woman, fainted while going to the bathroom at night, striking her head, and losing consciousness for some time. There was very copious bleeding from the left ear, on which account he was called in to determine whether she had sustained a fracture of the base of the skull. The chin was evidently the part which struck when the woman fell. Examination revealed a perfectly intact but inflamed drum membrane, and tests proved the hearing to be perfect. There was a linear laceration along the floor of the bony canal. It was perfectly apparent that she had had a fracture through the bony meatus, and that it did not affect the petrous bone. The force was transmitted through the inferior maxilla to the temporal bone.

DISCUSSION.

DR. J. E. SHEPPARD was reminded of the case, seen by him about three years ago, of a young man, twenty-three or twenty-four years old, who had fallen through an elevator shaft, with resulting marked deafness. The tympanic cavity on each side was filled with blood, but there was no rupture of the membrane. It was decided, after some deliberation, not to incise the drum membrane for fear of introducing infection. One ear recovered completely, the other partially. The point especially emphasized was that the drum membrane was not incised because of the danger of introducing infection.

DR. EDWARD B. DENCH recalled a case in which he opened the drum membrane and evacuated the blood, with resultant perfect recovery. There was facial paralysis. Dr. Dench thought there might have been a dehiscence in the facial canal.

DR. JOHN R. PAGE reported a case in which a man was injured in getting off a car. Examination proved that the right tympanum was filled with blood. There was some de-

liberation as to whether or not it was advisable to incise the drum membrane, because of the possibility of thereby infecting the labyrinth and meninges in case there had been a fracture through that part of the bone. There was considerable disturbance of equilibrium, and nystagmus, but as fairly good hearing was present, the supposition was that there was no fracture through the bony labyrinth, so the drum membrane was incised and the tympanum evacuated, with marked improvement in hearing and relief of tinnitus.

Chronic Purulent Otitis Media With Cholesteatoma.

DR. WENDELL C. PHILLIPS reported a case which emphasized a point brought out by Dr. Rae—the significance of one-sided headache in cases of chronic purulent otitis media. The patient, a man fifty-six years old, had had otitis media since childhood. Some weeks before he first saw the patient he had had a very severe attack of vertigo and vomiting, with a temporary elevation of temperature. This condition lasted several days. There was loss of hearing on the affected side. There was gradual recovery from the vertigo, but the patient complained of very severe headache on the affected side. When he first saw the man there was a very faint discharge from the ear, but the retained inspissated masses led him to suspect the presence of cholesteatoma. Tests showed an absolutely dead labyrinth, there being no response to the fistula or any of the usual tests. Radical mastoid operation was advised because of the suspected presence of cholesteatoma and of destruction of the labyrinth, and performed. In all his experience he had never seen such a large cholesteatoma. The entire space of bone, extending over the knee of the sinus, which was exposed, and including the entire tegmen over the mastoid antrum and attic, was destroyed. The dura over the middle of the cerebral fossa was uncovered. In doing the radical mastoid operation he found a distinct fistula. In clearing out the granulation tissue from the middle ear he found all the ossicles, even the stapes, gone. The labyrinth was opened and cleared out thoroughly. The posterior wound was not closed, because of the very extensive nature of the disease, and in order to be able to watch it for some days. The facial nerve was distinctly seen at the time. After twelve

hours slight paralysis of the facial nerve developed. There was a profuse discharge of pus for the first few days, but subsequently there was improvement in every particular except with reference to the intense headache. The patient was a very nervous man, and on several occasions he was given placeboes, after which he would go to sleep and sleep all night. After a week or ten days the postauricular wound was closed, and the patient was able to sit up and to walk around. He was never free, however, from the headache. After leaving the hospital he reported at the speaker's office every other day, until early in November. The headaches grew worse. He had a slight rise of temperature, but no paralysis; none of the signs which one would expect, not even the slow pulse. The pulse ranged around 75 and 80. His symptoms then grew worse, he was sent to the hospital, and lumbar puncture was made. The cerebrospinal fluid was cloudy, and there was evidence of sepsis. Between four o'clock in the afternoon and eight in the evening he had become unconscious. With no symptom to be guided by other than the persistent parietal pain, it was decided to search the middle cerebral fossa. Soon an encapsulated abscess was found, with a large amount of pus. On account of the very rapid manner in which the meninges were invaded, this abscess must have ruptured into the ventricle. The persistent hemicrania was relieved for a time by operation, but the patient finally succumbed to meningitis.

NEW YORK OTOLOGICAL SOCIETY.

Stated Meeting, January 27, 1914.

DR. F. WHITING, PRESIDENT, IN THE CHAIR.

Radiographic Plate Showing an Alveolar Abscess, With a Small Fragment of a Tooth in Situ.

DR. T. PASSMORE BERENS presented a radiographic plate showing an alveolar abscess, with a small fragment of a tooth in situ. The patient, a woman fifty-eight years of age, had had all the teeth of the upper jaw extracted six or seven years ago. Following this there was swelling in the canine fossa of one side, which would become larger and then smaller, until last November, when it was opened by the family physician and a large quantity of pus was found. He referred the patient to the speaker, who, upon operation, discovered the fragment of tooth in the bottom of the large cavity, with inflammation around it, and a cyst fully three-fourths of an inch in diameter, which was filled with pus. The upper border of this cyst was connected with the antrum of that side.

DISCUSSION.

DR. THOMAS J. HARRIS said he was called in to see this patient while Dr. Berens was operating. The unusual feature about the case was the large size of the cavity and its connection with the antrum.

DR. WILLIAM H. HASKIN recalled having reported, in 1908, three cases similar to the one cited by Dr. Berens. Since that time he had had seven or eight more. It was not an uncommon occurrence to find these remaining roots. It was likewise not uncommon to find teeth which have never erupted. He had had a case, a patient over sixty-two years of age, in which there was a history very similar to that of Dr. Berens' case. Extraction of the teeth had not relieved the pain, and on account of acute inflammation in the jaw the patient was sent to him. An unerupted upper lateral incisor was found

and removed. In each of three other cases, upon operating he encountered fully formed teeth. In one case there was a tooth which could not force itself down, and the root had developed upward, extending along the floor of the nose. The tooth was the shape of a comma. In another case there was a large dentigerous cyst. This was opened and swabbed with nitrate of silver solution, and the following day a hard, blackened mass was detected with a probe. It proved to be an odontoma on an unextracted root, and was probably the cause of the original pain. The man had had all his teeth extracted, without relief of pain.

DR. STEPHEN H. LUTZ cited a case in which a completely carious tooth had turned around and the crown had erupted into the antrum.

Fistula at the Apex of the Semicircular Canal.

DR. T. PASSMORE BERENS mentioned a case of fistula at the apex of the semicircular canal in a man fifty-five years of age, with a history of long standing suppuration. The patient was now convalescing after a Schwartze-Stacke operation, and the symptoms had almost entirely disappeared.

Venous Anomaly in Mastoid Operation.

DR. WENDELL C. PHILLIPS related an experience which he had had the day before with a colored female patient whose history was rather indefinite before the operation. She had had chronic suppuration for many years. A simple mastoid operation had been performed, and last summer she had had a radical operation. When the woman appeared at his service at the Postgraduate Hospital she had an unhealed radical mastoid wound. There was considerable inflammation in the postauricular region. He attempted to clear out by making a large wound and a large flap. As he began to curette the granulations from the attic, he found an unusual amount of hemorrhage. Just at this moment one of the house staff said he had operated upon this patient last summer, at which time there was very profuse hemorrhage. The pathologist had reported angioma. Proceeding with the present operation, further erosion of the bone, causing exposure of the dura, was found, and a mass was encountered between the oval and

round window posteriorly and the prominence anteriorly. As the granulations were cleared away he came down upon a large vessel which, from the color, was thought to be a vein. It was about the size of the external jugular, and was of sufficient size to cause him not to open it. He could not determine what it was. Whether it was an auxiliary petrosal, he could not say. It was evidently not the bulb, but it was connected with the lateral sinus in some way. He purposely made a very large incision in the concha; if, therefore, he is successful in closing the posterior wound, he will probably have an opportunity to study the case further.

Abnormality of the Bulb, or Malignancy.

DR. THOMAS J. HARRIS referred, in this connection, to a case reported before the Society last spring, in which he had operated, suspecting a protrusion of the bulb into the external auditory canal. The patient, a young man, had been under his observation for a week. He had been complaining of pain, the source of which the speaker endeavored to discover. In carrying the probe in he touched a protruding mass. After touching it again there was very profuse hemorrhage. The pain increased and the mastoid was explored. Nothing was found in the mastoid but this mass protruding out into the floor. The hemorrhage was so severe that it was impossible to go further. He concluded that the protrusion was the bulb. The immediate results of the operation were favorable. The small mass which was removed at the time was sent to the pathologist, who reported malignancy. The clinical diagnosis wavered between malignancy and abnormality of the bulb. He favored at first malignancy. There had been, however, no return of the growth and no return of the pain. It did not look now like malignancy, yet the bleeding was certainly more than usual with granulations. There must have been chronic suppuration in childhood, but there was no obtainable history of this. He was now of the opinion that the condition was not one of malignancy, but of abnormality of the bulb. A radiograph was taken, but it had no bearing upon the diagnosis or the clinical course. The radiographer insisted that there was trouble in the mastoid antrum, but there was none.

DISCUSSION.

DR. HASKIN thought it not at all uncommon to find the jugular bulb in direct contact with the floor of the labyrinth. He has, perhaps, as many as twenty bones which show this. He believed this to be the condition in Dr. Harris' case, which he saw at the time of operation.

DR. GRUENING said in the specimen presented, the bulb covered the fenestra rotunda. If the incision had been made downward instead of upward, the bulb would have been cut.

Discoloration of Drum Membrane.

DR. J. E. SHEPPARD reported a case in which there was a very dark discoloration of the drum membrane. The patient, a young man, consulted him, not about this ear, but about suppuration of the opposite ear, on which side the mastoid had been operated in 1902. The drum membrane was apparently bulging into the external auditory canal, and was of a dark bluish purple color. The landmarks were practically obscured, with the exception of what he thought was a faint outline of the malleus handle. He would be afraid to cut into it. The hearing for the watch this morning was fourteen inches, normal six feet. The hearing in November was as good as it is now. In looking over the history, taken in 1902, when he operated upon the patient, he found he had made the note that "this membrane appears cicatricial." He had made no note then of any discoloration, which he certainly would have done if it had been present.

DR. PHILLIPS called attention to the frequent occurrence of dehiscence in the floor of the bony canal. In this case, however, there was no dehiscence. It had been stated by one who examined Dr. Sheppard's case that these anomalies are more frequent in the colored race.

Hemorrhage in a Hemophiliac Male Child Two Years Old.

DR. SHEPPARD recalled having reported to the Society last spring a case of hemorrhage in a hemophiliac male child, two years old, resulting from incision of the drum membrane. He had subsequently to do a mastoid operation, which was followed by persistent bleeding. The child was given repeated

large amounts of human blood serum, with resultant cure. Last week a child eight months old, sex unknown, was brought in to him bleeding from both ears. He did not know whether the membranes had been incised, or whether the bleeding was spontaneous. At any rate, the family physician had been trying to stop the hemorrhage by using horse serum in 5 cc. doses. The horse serum appears more dangerous and less effective than human serum. The skin had been abraded around and behind the concha and on the drum membrane. Wherever there was abrasion there was hemorrhage. He had immediately given 20 cc. of human serum, followed by cessation of hemorrhage after two or three hours. There was no history of hemophilia in the family.

DISCUSSION.

DR. HARRIS was reminded of a case, of a baby a few days old, which came under his observation two or three years ago. At the urgent request of the family physician, who assumed all the responsibility, he operated for the removal of adenoids, which proved to be very large for a child of that size. The patient was well cared for afterward, but despite this, severe hemorrhage followed, and in fifty-six hours the child died. The case was not unique. The operation was indicated, and probably had very little to do with the bleeding.

DR. LUTZ asked if any one had had experience with "Coagulin," made by Parke, Davis & Company, from sheep serum. It is put up in ampules, dry and sterile, sterile water to be added when used. It is administered by hypodermatic intramuscular injection. It can also be used dry on a bleeding surface, and quickly causes a clot.

DR. JOSEPH A. KENEFICK mentioned the case of a girl, seventeen years of age, upon whom he had operated for adenoids. She was anemic. There was a history of hemophilia which, for some reason, the family physician did not give. All blood and other examinations were made. He found, to his great surprise, that he had operated upon a hemophiliac. The hemorrhage was persistent and severe, and was controlled for a day or two by packing. Finally he resorted to the use of horse serum, two doses of 50 cc. each. He was unable to state whether the clot occurred in consequence of the packing or the horse serum. At all events, the

"serum sickness" was extremely severe. The glandular swelling and fever lasted for several days. Under hot mustard poultices the glandular swelling subsided. Many cases have been reported in which a clot was secured by the use of horse serum. He referred in this connection to the work on hemolysis which had been done at Mount Sinai Hospital.

DR. SHEPPARD, in closing the discussion, said Welch had had good results in the newborn with the human serum. It was possible to get the serum within an hour or two. The Jewish Hospital of Brooklyn kept this human serum always on hand. They get it from the obstetrical ward, using therefor placenta giving a negative Wassermann reaction. The question of risk of introducing spirochetæ had been raised, but no trouble in this regard had been experienced.

Suppuration Following Aural Douching.

DR. HARRIS spoke of the mechanical effect, in certain cases, of water upon an old suppuration of the middle ear. For a long time he had thought it a coincidence, but now he is forced to believe that there is some relationship between the use of hot water and the recurrence of suppuration. He had recently noted this in two cases. Each patient came to him for what was thought to be earache. He found impacted cerumen. One had had no suppuration for seven and the other for ten years. Without any instrumentation whatever, and with unusual precautions, the ear was syringed with boiled water. In each case there resulted a suppuration which has been persistent and profuse. Whether the wax, remaining so long in situ, had covered a nest of bacteria which had accumulated there, and which multiplied rapidly when uncovered, he did not know. At any rate, the experience and the results were annoying. The bones were destroyed in each case. One patient was a lawyer, sixty-five years old, who had been treated as a child by a seton put in his arm.

Replying to a question by Dr. Whiting as to whether the supposed cerumen might not have been inspissated discharge, Dr. Harris said there was an inspissated discharge later, but the plug which he removed was characteristic cerumen. There was no trauma at all. The cerumen was very dry, and there was no pus behind it. There had been no discharge for years.

DISCUSSION.

DR. LUTZ said it was not an uncommon experience to clear out impacted cerumen and to find a large perforation in the drum membrane and a tympanic cavity filled with discharge. He had seen suppuration appear in an ear that had been apparently dry, and had considered that there was an opening in the membrane, that this had become plugged with cerumen, and that when the cerumen was removed the suppuration was started up again.

DR. HARRIS, replying to a question from Dr. Berens as to how he knew the plug was dry, said this could be judged from the appearance of the plug. There were absolutely no symptoms. It would seem that the plug, acting as a tumor, would have been the cause of pain.

DR. BERENS said he had asked the question about the plug of cerumen being dry because several years ago he had a similar experience, and for ten years he had not used a syringe at all. He used instruments exclusively. If these plugs are examined, one will sometimes see a cast of the inner wall of the tympanum, frequently presenting a little moist point of pus. If examined, they would no doubt prove to be filled with bacteria.

DR. SHEPPARD agreed with Dr. Berens with reference to douching, and was surprised that Dr. Harris laid emphasis upon the fact that he used no instruments. It had long been his practice to use instruments instead of water, particularly in old cases, and where the drum is known to be perforated.

DR. GRUENING considered the removal of a plug of cerumen by means of the syringe the most comfortable for the patient. Dry plugs could be softened with carbonate of soda, after which they could be easily removed. A patient with impacted cerumen might also have otitis media. Pain always indicated other trouble besides impacted cerumen. He believed the douche to be entirely harmless, but he thought the diagnosis of otitis media should be made before removing the plug.

DR. JOHN D. RICHARDS called attention to the possibility of mistaking eczema of the canal for cerumen. The syringe used in this condition may set up trouble which might persist for some time. He also recalled a case of cerumen in which the syringe had been used to remove the wax, and this had

started an eczema which lasted for four years and which was exceedingly annoying. This patient had never had eczema before, and since that experience he removed wax with instruments whenever that was possible.

DR. GRUENING added that when the canal is filled with a hard mass consisting not of wax but of desquamated epidermis, this accumulation can also be softened with carbonate of soda. It would be difficult to remove such a plug with instruments. When the soda has acted long enough the plug can be easily washed out. He never uses instruments in removing wax or any plugs which form from continued desquamation. This desquamation is not black, but of a yellowish white color.

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL
SOCIETY.

Regular Meeting, December 16, 1913.

DR. GEORGE W. BOOT IN THE CHAIR.

Paper: Lip Reading for the Adult Deaf.

MISS GERTRUDE TORREY, of Chicago: Some people find lip reading hard to learn—others find it comparatively easy. This is due to a difference in the type of mind. Teaching lip reading becomes a psychologic problem. The theory and basis of lip reading can be mastered in three or four months. Sometimes one becomes a fairly good lip reader in that time, but usually the first three months should be followed by from six months to a year or more of very thorough practice. A good lip reader can almost entirely overcome the handicap of deafness.

Every vowel and consonant has its own movement. Each movement is studied and then applied in words, in sentences, in stories, vowel exercises and consonant exercises are used, conversation practice, etc. The psychologic side is developed.

Successful lip reading depends upon the application of the principles. The most important point is a great deal of intelligent practice.

Miss Torrey gave a demonstration of two pupils—one entirely deaf, one very deaf—who carried on an impromptu conversation on various topics with her. They also talked with some of the physicians, and one spoke German with Dr. Beck, though all instruction in lip reading had been in English.

DISCUSSION.

MISS MARY McCOWEN thinks that Chicago is fortunate in having Miss Torrey, because there are a great many people in Chicago suffering with partial deafness, more than can be taken care of by the teachers who give their time principally to teaching deaf children. There are in operation in the night schools of the city of Chicago classes for adults who

are becoming deaf. Such classes are maintained on the south and north sides. But in these schools it is impossible to take care of all the people who wish instruction, because there are not enough teachers properly trained. The speaker's work has been very largely with little children. Speech reading is used, but it is purely incidental in the case of children. The first thing is to give these children an education, and speech is used as a medium of communication. With the adult, speech reading is, of course, a translation. It is learning another language. It is translating the language which we all know as a heard language into a language of movement. As Miss Torrey said, it is a language of movement, but the speaker would add that the movement is limited by the eyes. With adults the eyes may not amount to very much, but with little children we find that the eyes are very important, because the movement that does not begin at a definite point and end at a definite point does not get anywhere, and does not convey any definite idea to the child's mind.

Another point with reference to the speech reading of adults: It is a tremendous advantage for a person who is partially deaf to begin to get speech reading before he or she is acknowledged to be very deaf, for his or her own sake, and also for the sake of others. If the community reaches the conclusion that a person is deaf, and that it is difficult to communicate with him, before that person had acquired speech reading, he is forever handicapped. It makes no difference how well he acquires it afterwards. If everyone, the moment they began to feel that deafness was coming upon them, even in the slightest degree, would begin at once to watch the face and learn speech reading, either through a teacher or unconsciously, without a teacher, it would be of wonderful advantage. Many have acquired very excellent speech reading through their own determination. Deafness often grows upon people, and speech reading would perform its function better and better; and while speech reading never can take the place of hearing, yet the disability of deafness would be very greatly modified.

DR. E. L. KENYON said when one has reached the point in loss of hearing where ordinary conversation has become difficult, that person is bound to go through life with a great handicap. We all know this. The speaker merely wished

to emphasize it. His mother was deaf from the time she was thirty years old, following typhoid fever. She was so deaf that she could not hear ordinary conversation in a room. She never had any training in lip reading—the doctor did not know what the status of lip reading was at that time, but the speaker's life is filled with realization of the pathos of deafness.

Of course, when an adult becomes deaf, he does not necessarily become totally deaf, as we all know. The point which he wished to emphasize was that one should conserve every bit of hearing that can possibly be conserved. One should not only cultivate lip reading in those that are deaf, but still have hearing, but he should cultivate increased capability of hearing for words. He would take up Miss McCowen's thought, that lip reading should be begun early, before hearing has been lost, and go further: He would say that training of the ear should be begun the moment, or as soon as possible after, the individual knows that he is to become deaf. We hear largely by hearing key sounds, particularly if we hear badly. These key sounds are sounds which give us a cue as to what the rest of the word is. So his contention would be that we should educate the hearing of these people by analyzing the words phonetically for them, with the idea of giving them an appreciation of the individual sounds in those words, so that they could better interpret the complete word from the part heard.

He wished to express his appreciation of the exhibition of lip reading. But we must bear in mind that, in the first place, not all individuals perhaps can succeed in lip reading like those shown, and, in the second place, that not all individuals are talking with their own teacher, a trained lip reader, although, of course, he appreciated that these pupils talked with others, too; but what he wished to emphasize was that any aid which the deaf can have is to be brought into use, whether it be mechanical appliances for the ear, whether it be lip reading, or the education of the ear to appreciate what he called key sounds.

Possibly something could be done by this organization to inaugurate a movement for the education of the public in the matters of prevention and amelioration of deafness. How many people, for example, are acquainted with the value of

lip reading to the adult deaf? Or how many are familiar with the importance of early teaching lip reading to the child who has become deaf? Or how many appreciate the necessity of early treatment of pathologic conditions affecting the ears? Such a social work of education is being done for the eye, and should be done also for the ear.

DR. JOSEPH C. BECK said that we are having less deafness than formerly, which he believes is due to the fact that we recognize the etiologic factors producing deafness. Of course, this does not refer to cases of congenital deafness, but to cases of acquired deafness.

As long ago as last year, in discussion at the State meeting, did the speaker voice an opinion against this attempt to teach the hard hearing individuals lip reading, and he thought, as Dr. Kenyon mentioned, to stimulate the hard hearing people to try and hear without watching the lips, and so stimulate the auditory nerve and the acoustic apparatus so that it would be kept in action. He always remembered this lesson from Professor Zaufal, who insisted on that. But he believes now, and is willing to be convinced, that the mistake is perhaps made too often the other way, in waiting too long. Especially is this the case in otosclerotic individuals, and he has now under observation several patients of this form who are being instructed in lip reading.

Of course, some people learn lip reading readily, as he would show by the demonstration of a case, but others find it very difficult. For instance, he has a patient, thirteen years of age, who is practically deaf, but who does not respond the least bit to lip reading.

Something might also be said on the side of the question that many people run their words together in speaking, or there is not much lip action, or people do not accentuate clearly, and so that is a difficulty in understanding them, especially for hard hearing people.

Presentation of Patient.—Young woman, twenty-four years old. Diagnosis, otosclerosis. Practically deaf for seven years, and hard hearing since eight years of age. This young woman is a perfect lip reader, and never has had a single lesson. The hearing test in this case shows that only the loudest whistles can be heard. (Demonstration of patient reading the lips of various individuals.)

DR. J. R. FLETCHER asked Dr. Kenyon, since he had had experience with deafness in his family, what he considered the relative catastrophe between deafness and blindness?

DR. KENYON said he did not know that he had an intelligent answer for this question, but that Miss McCowen might have. He has never analyzed it carefully enough to know. It might be somewhat temperamental with the individual, and also depend somewhat upon the life conditions of the individual. On the whole, he is inclined to think that deafness is a more serious affliction than blindness. There is something so essential to human contentment that people should be able to carry on quick thought with those about them. It seems to him that it must be exceedingly hard to bear that one is unable to do that.

DR. J. R. FLETCHER mentioned this because a gentleman voluntarily said to him the other day that it seemed to him deaf people are far worse off than the blind. This man said he had lived with two uncles, one deaf and the other blind. The blind man was one of the happiest men, and the sweetest natures. The deaf uncle was mean, morose, melancholy and suspicious, and generally disagreeable, and life was not worth while. This man said that he would choose blindness, if necessary, of the two afflictions.

DR. OTIS H. MACLAY had been very much pleased with Miss Torrey's paper and the discussion, and believed all the members would join with him in this expression of appreciation.

There is one point otologists should consider, namely, that when patients are not being helped, they should be advised to learn lip reading. It would only be fair to them as well as to the profession as a whole.

A future meeting of the Society might be arranged, where we could follow out some of the ideas brought out at this one.

DR. J. HOLINGER asked what is the pathology of these cases? Most frequently they are otosclerosis, starting at the age of sixteen, eighteen or twenty. As soon as we notice that the patient is going beyond the usual degree of hard hearing, where he cannot very well understand conversation, then he is certainly a subject for lip reading. Hearing exercises are of no value.

In labyrinth deafness after infectious diseases, scarlet fever

and typhoid fever, etc., the deafness is from the start of such a degree that lip reading is absolutely necessary.

In hard hearing caused by chronic suppuration of the middle ear the danger to the life of the patient is often more important than the function of the ear.

MISS TORREY, in closing the discussion, referred to the thought suggested by Dr. Beck, on the possibility of lip readers not trying to hear. As a rule, a person who is deaf and who is not a lip reader does not try to hear unless addressed personally. He thinks it is too hard, or useless, and he is apt to become engrossed in his own thoughts. This fact is admitted by many who are deaf. Successful lip reading calls for absolute concentration and for great mental alertness which reacts upon all the senses, making them more sensitive to the impressions they receive. A good lip reader sees more and feels more than the average "normal," and probably hears more than one who is not a lip reader, of the same degree of deafness. For the mind is ready to respond to anything that will help in understanding, no matter through which sense the help comes. And for this reason it seems probable that the ear is used fully as much as in the case of one who is not a lip reader.

Paper: Diseases of the Antrum.

DR. TRUMAN W. BROPHY, of Chicago: The clinical experience of an oral surgeon is filled with examples of early neglect of the teeth, and this neglect is manifested in the development of many diseases, some of which are of the gravest character. Ninety-seven per cent of all people have diseases of the teeth. The teeth, therefore, are more subject to diseases than any other tissue of the body. The physician should have some knowledge of the symptoms produced by diseased teeth. It is through this lack of knowledge that many operations about the face are failures. The making of external incisions through the face, based upon an erroneous diagnosis, is an unwarranted procedure, yet it is of common occurrence.

The anatomy of the antrum was then taken up in detail. Following this, the author opened a discussion upon empyema of the antrum. When we realize that the apices of tooth roots often penetrate the antrum, the prevalence of dental caries, pulpitis, infection of dental pulps, infection of the pericementum by reason of the decomposition of tooth pulps,

the passage of pathogenic microorganisms through the apical foramen, the formation of dentoalveolar abscesses, and, further, keeping in mind that pus will, as a rule, make its exit through the surface which affords the least resistance, it is easy to understand why empyema of the antrum so frequently follows the formation of dentoalveolar abscesses and other infections of dental origin. A tooth with a dead pericementum is like a piece of necrotic bone; it should be taken away. Suppurative dentoalveolitis unquestionably may be the cause of empyema of the antrum. This is frequently overlooked. Empyema of the antrum may also follow rhinitis, infection of the frontal or accessory sinuses, foreign bodies in the antrum and diseases of the nasal tract. It also comes as a result of careless handling after removing a tooth. The antrum may be punctured by the examiner and infected material forced into it. Fully seventy-five per cent of the cases are the result of some dental lesion. The surgeon should use every means at his command to determine the vitality of the teeth in empyema of the antrum.

The symptoms of empyema of the antrum followed this discussion. In the diagnosis of this condition it is not necessary to open the antrum through the nose, as a small opening may be made in the canine fossa and the cavity flushed out by inserting a syringe. The dental engine may be used here advantageously. Transillumination and X-ray pictures should be brought into service. It is essential to examine all the teeth.

In the treatment of empyema of the antrum it is necessary that thorough drainage be established, and that polypi, diseased teeth and bone and foreign substances be removed. The removal of a sound or diseased tooth for such a purpose is not warranted except where the tooth is not firm in its socket. Although diseased teeth may have been the primary cause of the condition, they are often amenable to successful treatment. The importance of the function of the teeth demands that they should be cured, if possible, and restored to usefulness. The various operations for the cure of empyema of the antrum were then discussed. Regarding the openings made into the antrum through the nose, the author stated: "Nature created an aperture of communication, the ostium maxillare, between the nose and the antrum. It is the surgeon's duty, in case this

opening has been closed by adhesions as the result of inflammation, to open it and reestablish its function, instead of making a large unnatural opening at the base of the nose through which dust and mucus may enter the antrum, thus becoming a constant irritant and making the permanent cure of the disease impossible."

Any operation for the treatment of chronic empyema of the antrum which does not admit of an ocular examination of the antral walls is extremely faulty. In nearly all cases of chronic empyema, polypi are seen. It is their presence which explains the failure of cure in so many cases treated through small openings. To treat the antrum in such a manner as will give the surgeon a complete understanding of the exact condition of the part, a large opening through the canine fossa should be made. After the patient is anesthetized, the lip is reflected upward and an incision is made one and a half inches in length directly above the cuspid tooth root. Another incision is made downward a half inch above the first one, and the periosteum elevated so as to leave a considerable area of bone exposed. The cavity is then punctured by means of the dental engine and a bur. A button-shaped piece of bone is removed and the finger introduced. Polypi are curetted and foreign bodies removed. The mucous membrane in the walls, if possible, is not disturbed. The antrum is then dried with sponges and the cavity packed with sterile gauze. The gauze is changed every other day for ten days, when an antral plug is made and placed in the opening. This is kept in until the walls of the antrum are normal, which is determined by illuminating.

DISCUSSION.

DR. C. M. ROBERTSON said there are some points about diseases of the antrum that Dr. Brophy did not mention, and which the speaker thinks are not generally understood. One is that antrum diseases are sometimes caused by posterior ethmoiditis and sphenoid abscess. He noticed in some of the pictures that the laminae that were present in some of the antra were more complete than in others. This was due to the formation of the antrum in early life, in which the ethmoidal cells pushed down. Those are ethmoidal cells; they are not part of the antrum. That is particularly so in the pos-

terior part of the antrum, and in cases in which we go through the antrum as the short route to the sphenoidal sinus, we often find a posterior eminence, which is a posterior ethmoidal cell, very prominent, and in some cases it dips down, so that it fills half of the antral cavity. If absorption goes on far enough the wall of this posterior ethmoidal cell is done away with, leaving only a lamina, which might appear as though there were a partition in the sinus itself, and part of the sinus, rather than being a remnant of the posterior ethmoidal cell. Those are the inferior cells of the ethmoid, just as we have the superior cells going over the orbit, and the cells that go down into the middle turbinate, the middle cells. This condition Dr. Robertson has noticed very frequently in the cadaver.

Regarding the etiology, of course, the dentist requires that everything comes from the teeth, so that Dr. Brophy says that seventy-five per cent of the cases occur from dental origin. We will in turn give him twenty-five per cent, and say seventy-five per cent occur from nasal origin. We will have to admit, however, that most of the cases show a caries in the molar teeth.

We have cases of nonsuppurative inflammations of these sinuses. The first man to discuss and write about this was from the middle part of New York State, and the speaker believes that he was the next one. Then Dr. Brawley, of Chicago, reported on a number of cases with all the subjective without the objective symptoms of empyema. They are just as suspicious as the cases where pus is present. They are cases of stenosis of the maxillary ostium in which there is a hypertrophy or a bony cystic degeneration of the middle turbinate occluding the ostium.

One of the most common symptoms that we have to treat in connection with antral diseases is the condition that occurs in the respiratory tract further down, resulting in asthma, bronchitis, and the reflexes that occur from the pus in the nose. The objective sign—pus in the antrum—does not mean anything—we can have it from so many causes. As stated before, we can have it from a sphenoid sinus coming from behind downward; from the posterior ethmoidal cell in the same direction; from a middle ethmoidal cell, and we very frequently have it as a reservoir from an ethmoidal cell or a frontal sinus.

Bosworth has reported one case in which there was pus in the antrum for thirty years, draining from a frontal sinus, and the antral mucous membrane remained normal. Thus we must be careful about our objective signs.

Walter's negative pressure apparatus the speaker had never heard about before, but he had heard of other negative pressures, and it is hard to imagine a better negative pressure than the Brawley pump or the pump of Dr. Pyncheon.

Puncture through the canine fossa has always been objectionable to Dr. Robertson, on account of, first, infection that occurs in the mouth from the nose, and, second, in the antrum from the mouth. The antrum is a nasal accessory sinus, and it seemed to the speaker that drainage should be made in the place where nature intended it to be. We do not recognize the alveolar process as a place for draining. Neither does Dr. Brophy. Dr. Brophy's canine fossa, or the Caldwell-Luc route, is a more direct and better one than the alveolar. But the antral wall of the inferior meatus, in the speaker's opinion, is the selective point. He read a paper on radical operation on the antrum about five or six years ago before the North Side Medical Society, and it was at that time criticized. It was said that it was impossible to do what he said he could do. He has demonstrated time and time again that he can operate upon the antrum of Highmore and cut away the entire inferior wall—that is, the wall in the inferior meatus—and save the entire inferior turbinate body, so that anybody looking into that nose could not tell that the antrum had been opened, and at the same time the antrum has an opening of the entire extent of the inferior meatus. This, to his mind, is a better operation than the Denker or the Caldwell-Luc, or the operation of Dr. Canfield, and it is very easy of accomplishment. The operation is done exactly the same way Dr. Brophy does, so far as entering the antrum. After the antrum is entered, the maxillary wall is cut away, down to the nasal wall, so that you can see the attachment in the antrum of the inferior turbinate body, which is a decided ridge, always running from before backward and downward. In this operation the nasal mucous membrane is saved. We do not go into the nose until the operation is completed. In doing this, if care is taken to cut away the bone at the top of the supposed wound-to-be, going along the at-

tachment of the inferior turbinate as far as you wish to make your opening, and then tearing down the wall to the floor of the nasal cavity, we can level off, no matter whether the antrum goes below the floor of the nose, or on a level with the nose, or above. In this we do not have any place for the pus to collect. After that wall is completely dissected away, the mucous membrane of the nose having been left intact, not having as yet been perforated, the floor of the antrum and the floor of the nose being on the flush absolutely, then the cavity of the nose is opened by a sagittal section through the mucous membrane, making four flaps, and the four flaps are then folded back into the antrum. It is the same thing as the Denker operation contemplates by one flap, but Denker is careless about the technic, so that he has a mucous membrane that does not attach, and therefore the antrum fills up again by granulation. If you are very particular, folding the flaps around the corners of this newly made opening into the nose, and holding the mucous membrane flaps of the nose in place by packing, the opening becomes permanent just as you leave it, and the inferior turbinate is not touched at all. In that way the dirt does not fall in, there is no mucus, there are no crusts, and nobody would ever know that that antrum had been opened, although you have an opening equal in extent to the amount of bone cut away from the inferior meatal wall. The buccal cavity is closed as the last step of the operation. The packing is left in long enough for these flaps to attach, and that is all the treatment necessary. There is drainage produced, and our distinguished friend, Dr. Brophy, after he produced his drainage, which he says it is essential to produce, and all that is necessary, then tells us about therapeutics. That part of the paper Dr. Robertson would criticize. There is no necessity for therapeutics. He never washes these cavities out after operations. He has never seen one case of scabbing, and he has never seen a case with permanent discharge, except where necrosis is extensive. He leaves the dressing in for five days, it comes out easily without tearing the flaps loose, and there is a permanent opening that does not show. And that, to the speaker's idea, is a classical operation. He has performed it for five years. He has examined these cases repeatedly to see if they remained as he left them, and they did.

The speaker believed with Dr. Brophy that we should be conservative of the nasal mucosa, because that is a most important physiologic tissue in the body. It is a respiratory tissue, and it is wrong to injure these tissues in any way, when it can possibly be avoided.

Another thing: There is a difference between polypi and exuberant granulations. His idea is that very many cases of empyema of the maxillary sinus have no polypi at all. They are all exuberant granulations. One is a product of heat and moisture; the other a myxoma which is a true growth.

DR. FREER said a polypus was an inflammatory product, not a myxoma.

DR. ROBERTSON said it was an inflammatory polypoid edema—granuloma. He has a patient, whom he has exhibited on various occasions, who has a bilateral empyema of the maxillary sinus of some years' duration, and her nose is still full of so-called polypi. This woman's antrum is washed out by means of the ordinary grooved Kraus cannula, and after two or three days she will blow polypi out of the nose. In a condition like that, if you produce drainage, the polypi will shrink up. Those are exuberant granulations, and as soon as you take the moisture away the things disappear. He has had several cases recently in which molar teeth were found in the antrum, one against the nasal wall in the anterior corner. The most important part of the whole operation—to get the anterior apex of the antral cavity as clean as this—is the point most apt to present persistent granulations.

DR. OTTO T. FREER said that Claoué, of France, and Rethi, of Vienna, followed by Holbrook Curtis, in America, were the first to intranasally remove a portion of the nasal wall of the maxillary antrum for the relief of empyema. Dr. Freer was the first to perform and advocate the operation in Chicago. His first case was presented to the Chicago Laryngological and Otolological Society, in 1904 (*Illinois Medical Journal*, 1905; *Laryngoscope*, 1905). The perfected method was described in *The Journal of the Michigan State Medical Society*, 1912. Experience has only confirmed Dr. Freer's impression of that time, that the ideal method for the relief of chronic antral empyema is the intranasal resection, with bur and trephine, of a large part of the nasal wall of the antrum in the inferior meatus. Had Dr. Brophy seen Dr. Freer's

results, he would not have mentioned as facts theoretically reasoned evil consequences. With only rare exceptions the patients recover in a few weeks, and stay well, and Dr. Freer has seen none that suffered from the drawbacks spoken of by Dr. Brophy. After the bone wounds are healed there is no scabbing, there is no chronic mucous discharge, and the mucous membrane, both within and without the antrum cavity, looks moist, pink and healthy in all but the very rare complicated cases.

In the exceptional cases, where pus continues to come from the antrum after the operation, it usually does so because the antrum acts as a receptacle for discharge from a suppurating frontal sinus. Caries, polypi, irremediable degeneration of the mucous membrane and ulceration are conditions given a prominence in textbooks that would make them seem not unusual complications of antrum suppuration, while in reality they are extremely rare, the rule being that inspection through the intranasal opening shows the mucous lining of the antrum to be normal and not even thickened. The level of the floor of the antrum below that of the nasal cavity does not interfere enough with drainage to be of moment.

Not only does an opening through the nasal wall open the antrum into the cavity with which it is intended to communicate—that is, the nasal cavity and not the mouth—but the nasal wall of the antrum is anatomically its least important one, and it is only where direct access to the antrum is demanded for such conditions as tumors or caries that the route through the facial or, as it is also called, buccal wall should be chosen, for this highly organized wall contains the roots of the teeth and the anterior dental nerve. In fact, an opening through the facial wall is, in all but the rarest cases, an objectless mutilation.

For these reasons the simple operation through the nasal wall should supplant for all but complicated cases of chronic antrum suppuration, the needlessly formidable Caldwell-Luc, Denker and Canfield operations, which interfere with the facial skeleton and are seldom necessary. I emphasize this because, even after so many years, the intranasal operation is not yet generally appreciated, and patients are unnecessarily being subjected to the extensive procedures mentioned. The chief reason for the popularity of entrance to the antrum

through its facial wall is the unfamiliarity of the average surgeon with intranasal work, so that the easier direct way is chosen, to the patient's detriment.

The resection of the nasal wall of the maxillary antrum in the middle meatus, practiced by some, has the serious objection that the orbit is in danger of penetration, and it has been penetrated by puncture in this region. The opening obtainable in the middle meatus is a narrow slit which does not permit of inspection of the interior of the antrum, as does the opening in the lower meatus, while drainage is poor, as the opening is at the very top of the antrum. There are cases where the pus in chronic empyema clots into a mass of cheese, which lies in the bottom of the antrum and requires a large opening for its removal. The middle meatus route is not even good for diagnostic puncture with a trocar, for in washing out the antrum through the cannula of the trocar the return flow may bring clear water, the entering stream having merely flowed over the thick pus lying in the bottom of the antrum. I describe this from my own experience.

As an example, Dr. Freer relieved a young woman of a double antrum suppuration by broad openings in the lower meati, after openings through the middle meati by another operator had been of no avail. The only excuse for choice of the middle meatus route is that it is an easy one.

As Dr. Freer operates, his first opening is made for diagnosis. He is as fond of the dental engine as is Dr. Brophy, and regards it as typifying the genius of oral surgery, which Dr. Brophy has done so much to advance. General surgery can show no such beautiful instrument. A large trephine driven by the engine is introduced underneath the inferior turbinate, after previous cocaineization with pure cocaine in the form of flake crystals. The trephine's cutting edge is pressed against the nasal wall of the antrum as far forward in the lower meatus as possible by crowding the shank of the trephine against the flexible cartilaginous septum, which is bent over by it towards the other nostril, the trephine thus being made to cross the naris of the operation at an angle of about forty-five degrees. The power is then turned on, and in the usual case instantly and painlessly a smooth oval hole is made in the antral wall large enough to permit the use of a large eustachian catheter for washing out the antrum, with plenty

of room to permit the escape of clots beside the catheter. In distinction to this the trocar and cannula usually employed cause great pain in making the puncture, create a stellate fracture, and often fail to penetrate at all where the bone is thick in the lower meatus. In addition, the cannula tightly fills the opening made, so that there is no room for a counter current beside it, and none is possible where the natural opening of the antrum is closed by swelling or polypi.

If the diagnostic opening with the trephine brings pus from the antrum, the opening, in mild cases, is merely enlarged underneath the lower turbinate with the trephine and bur, without cutting away any of the turbinate. This leaves hidden under the turbinate a large aperture, which is apt to close, but usually not before the suppuration has ceased. In most cases, however, in order to get a surely permanent opening, the anterior one-third to one-half of the inferior turbinate has to be resected by Dr. Freer's flap resection, which preserves the mucosa of the convexity of the turbinate, which curls into the aperture in the antrum, and giving it a smooth edge above. After the turbinate resection the diagnostic trephine opening is enlarged with the bur and cutting forceps until it takes in all of the lower meatus down to the nasal floor. The mucosa of the antrum's interior is left intact and is not curetted. It is usually normal or capable of becoming so, if left alone. The operation leaves no denuded surfaces to granulate, for the bone opening always exceeds the opening in the mucosa, which gets out of the way of the bur. In fact, it is due to concentric contraction of the mucosal opening that the aperture always loses half of its area after healing, and, if not made large enough, it sometimes closes up again by a membranous diaphragm. For this reason redundant mucosa must be cut away in the operation. The complete operation may be done under general or local anesthesia, the latter usually being employed.

DR. JOSEPH C. BECK said that first he would like to object to Dr. Robertson's reference. He never said that the operation could not be done. He said he would not want to do it in that manner.

Dr. Beck enjoyed Dr. Brophy's paper immensely because it agreed with many of his own sentiments regarding the treatment of suppuration of the antrum. The one criticism

that he would like to make was that not enough attention was paid to the pathologic lesions that we deal with. It makes a big difference as to the change in the tissues in a chronic suppuration of the antrum. A case may be chronic, yet, as suggested by Dr. Freer, if well opened up in the inferior meatus, will get well, because we drain and ventilate the cavity—especially is this the case if it is not associated with infections of the other sinuses.

A chronic osteitis associated with chronic suppuration of the antrum will not get well by an opening in the inferior meatus, no matter if it is as big as a house. It is a pathologic process that must be eradicated by thorough curettage and obliteration of the entire cavity. This has been his practice in cases that will not get well by an opening in the inferior meatus.

The speaker asked Dr. Brophy what took place in that cavity when he had scraped the bone and put the plug in. Certainly, not mucous membrane. It must be a scar membrane. A closed cavity lined with scar will suppurate. He said this from experience, because he has reopened these cavities.

His method of dealing with chronic suppurations, after trying simple operations, is to obliterate the cavity as nearly as possible. He has now sixteen cases on record that have been treated and cured by this operation.

DR. GEORGE E. SHAMBAUGH, in speaking of the etiology of antrum infection, stated that before the development of rhinology these cases were handled almost exclusively by the dentists, and the conclusions expressed by Dr. Brophy that most of these cases are caused by dental infection corresponds with the view that was generally accepted before the advent of rhinology. Most of the cases that come under the observation of a dentist no doubt have dental origin; the dentists are consulted because of the teeth, or the patients come to the dentist because of an acute pain in the side of the face, following distinctly an alveolar abscess, of which the patient has been aware. The rhinologist today sees many more cases than go to the dentist; he sees not only the cases of dental origin, but those that have their origin from infection of the nose. The rhinologist has found that a relatively small percentage of cases of antrum infection have a dental origin.

The speaker in listening to the discussions was surprised

that in the suggestions regarding treatment nothing had been said regarding the easiest and very often the most efficient way of making an opening into the antrum. This is by breaking through the thinnest portion of the antral wall, namely, the so-called nasal fontanelle, which lies in the middle meatus. Here there are areas of considerable size where the antrum is separated from the nose simply by the mucous membrane coverings. In an exploratory puncture of the antrum for irrigation, in making a diagnosis, this is by far the easiest and best way for entering the antrum. In cases of acute empyema of the antrum it is very unusual that one has to resort even to any artificial openings. In treating chronic cases of antrum empyema Dr. Shambaugh has been able to cure a great many cases by making a large opening in the middle meatus of the nose. In his opinion this is very often the method of choice in undertaking the cure of a chronic antrum infection. There are cases, however, where it is impossible to get a satisfactory result by working through the middle meatus. In cases where a more radical procedure is called for, the Denker operation gives us our best chance for eradicating the trouble.

DR. J. R. FLETCHER was rather surprised that nothing had been said of the bony cysts which have been shown in various works to be sometimes so enormous that they almost entirely fill the space which should be occupied by the antrum of Highmore. He is rather of the opinion that they are much more numerous than is generally thought. If we enter habitually through the canine fossa, we will now and then be dealing with a suppurating dentigerous cyst, and have no communication, except in very rare instances, when the communication is formed by the death of the bone posteriorly. He would think that dentists would have more opportunity to find these than rhinologists, but perhaps rhinologists do not find them as often as they might, because they do not look for them and keep them in mind. The speaker read a paper on this subject before the Society three or four years ago, which some of the members might remember.

He was further very much pleased to hear Dr. Shambaugh call attention to the route of the middle meatus. That is certainly the easiest point to make your entry. Oftentimes, instead of going through the elaborate procedure mentioned by Dr. Brophy to find if there is pus in the antrum, it is ad-

visible to have an easier route, and the one spoken of by Dr. Shambaugh is the easy route. Quite a large percentage of cases are cured when we go between the middle and the inferior turbinates. He is not of the opinion that the antrum must be on the level of the inferior wall of the nose, in order to give good drainage. The head is not fixed—it is decidedly movable.

DR. J. HOLINGER thought the members were dealing with a borderline subject, and of course each one finds what he is looking for on his side of the fence. Each one may have his justification. But he would call attention to the patient exhibited by Dr. Brophy. He had treated her for many months through that opening. Even though the suppuration stops temporarily, did Dr. Brophy think that he had a normal mucous membrane in there? Did Dr. Brophy make a microscopic examination of the membrane? After all the manipulations, it is impossible that there can be a normal lining of an antrum of Highmore. Sooner or later, if he allows the opening to close, the cavity will suppurate again. This is the clinical experience of rhinologists of the last twenty years, and is supported by microscopic findings.

After scraping out the mucous membrane you have nothing else to put in its place except granulations. You leave a granulating and therefore suppurating surface. Denker does not destroy any mucous membrane of the antrum except the floor, which he covers afterwards with the mucous membrane of the lateral wall between the antrum and the nose. In a week the patients are cured, and safe from relapses. Dr. Brophy treats his patients from six to nine months. The speaker's patients would not stand for that, and he would not expect it of them, so long as he can cure them in a week. If Dr. Holinger sees that after three or four washings of the antrum with boric acid solution he cannot make headway, that the discharge and odor do not diminish, he tells them to go to the hospital, where a radical operation is performed. He has never seen a suppuration recur, but even if that should happen, the patient can easily wash out the antrum himself through this permanent opening. He has never seen any trouble after a Denker operation, but he has seen a lot of it after other operations.

DR. OTIS H. MACLAY said the essayist had spoken of doing

the work with the least manipulation and the least sacrificing of tissue, and he thought that everyone agreed with him in that, and it is only a matter of where to place this. It seemed to him that, on the basis that ventilation plays equally an important factor in the work as drainage, we do not need to get a great big opening in order to cure these cases. With a fairly good opening in the middle meatus, we run a good chance of curing many of the cases, and he is of the opinion that we ought to do that first in all cases—at least give them a chance, and, if necessary, further work can be done, but the middle meatus route should be adopted first.

DR. JOHN A. CAVANAUGH wished to call the attention of the members to a few specimens of the antrum which he has, especially as Dr. Brophy mentioned entering the antrum through the canine fossa. He has two or three specimens where the antra were very small, and in such cases this operation is absolutely impossible. The speaker had a case a year ago, in which a dentist had gone through the canine fossa, thinking he was in the antrum. At first Dr. Cavanaugh thought so, too; but, the trouble persisting, he passed a probe into the opening through the canine fossa, and, looking into the nose, found that the probe passed into the lower meatus of the nasal cavity. The opening was not into the antral cavity at all.

Dr. Cavanaugh believes that all the accessory cavities that are found in the cheek bone, otherwise than the one which opens from the infundibulum, are not antral cavities, because the antrum itself develops from the middle meatus, directly from the lower part of the infundibulum. The maxillary process of the inferior turbinate forms the inner wall of the antrum, so no matter how small the antrum is, if a needle be passed underneath the inferior turbinal, about three-fourths of an inch, from the anterior end at its attachment to the lateral wall, it will always pass directly into the antral cavity, regardless of the size.

Another thing: In going through the alveolar process he has found that just anterior to the molar ridge is the thinnest part of the anterior wall of the antral cavity, and in passing a bur or a needle upward in the direction of the supraorbital foramen, it will always pass into the antral cavity.

DR. BROPHY, in closing the discussion, thanked the mem-

bers of the Society for jumping on him so lightly. However, he had this consolation, that while the speakers might not agree with him, they had also failed to agree with one another.

He was greatly pleased with Dr. Robertson's remarks, and was pleased to hear that he does not destroy as much of the bony wall between the antrum and the nose as some of the others. He saves the mucous membrane and preserves the integrity of the antral cavity and of the nasal cavity. He endeavors to restore, in other words, what he takes away. The surgeon who has the highest aims must keep in mind the importance of preserving the anatomy of the parts upon which he operates.

Nature made this cavity for a purpose. It provides a natural opening through which air and fluids may pass. It becomes our duty as surgeons to endeavor to reestablish that opening, if by some cause it has been closed, and enable nature to perform her functions normally. The criticism he would offer on Dr. Robertson's questions is that sometimes the membrane does not reunite, and then there would be a calamity on his hands—an unnatural opening through which dust and dirt and fluids and waste and incrustations might develop. Nature provided the ostium maxillare and put it in a place where dust and dirt cannot be readily admitted, above the inferior turbinate bone, and it should be preserved or reestablished, if for any reason it has been closed.

Dr. Robertson said that usually you find carious teeth when there is disease of the antrum. The speaker wished to ask, in all fairness, if the members did not think that sometimes they overlooked a tooth with a dead pulp, which was absolutely sound so far as external appearances indicated, and that the infection may have arisen from this source? He personally had no doubt of it.

How does the rhinologist know that these teeth do not contain dead pulps, when the expert dentist, with all the facilities at his command, finds it difficult to determine whether the pulp in a tooth is living or dead? Part of the pulp may be living and part of it dead. Such a condition may be misleading to the observer.

It is true that a large opening through the nasoantral wall will admit of good drainage so that the constantly forming pus at the roof ends of teeth may easily escape, and inasmuch

as it is not retained in the cavity the patient is not subjected to great discomfort.

Medical colleges have not taught diseases of the teeth. Medicine is said to be the healing art in all its branches. It is not any such a thing, except in part of its branches. Some few colleges are teaching dental pathology—others do not teach it at all.

Regarding Dr. Freer—there is some hope for him, because he has given up extensive cutting out of the nasoastral wall. The speaker would have been glad to give a fellow countryman the credit for the operation, if he had known his name. He is glad that Dr. Freer uses the dental engine.

Some speaker referred to the "elaborate way" he had of opening the antrum and the more simple way of going in through the nose and around the corner. Who can do it quicker than the speaker, with this engine? You don't need to make an incision. The thinnest part of the wall is just above the canine fossa; you put the instrument in place and in a second the antrum is opened; introduce a small-pointed syringe and flush it out, and if there is any pus in there, you know it.

Dr. Beck asked what you will find in an antrum that you open and curette. In many you find nothing but pus—no membranes at all. The bone is denuded absolutely. What will happen to that kind of an antrum?

Dr. Shambaugh's plan of opening through the middle meatus is probably a most excellent one. The speaker has never tried it, because he thinks he has a better way.

Dr. Fletcher spoke of dentigerous cysts and their involvement of this cavity, and of the elaborate care that the speaker pursued in opening the antrum, which is positively the quickest way. Dentigerous cysts do involve the antrum, but Dr. Brophy does not regard them as the cause of empyema, except in rare cases.

Dr. Holinger spoke of normal membrane. He does not agree with anybody else who spoke. He believes in the Denker operation.

In these old cases that have been running on for a long time, the speaker does not generally find any membrane on opening them—he finds nothing but bone denuded of all tissues.

Dr. Cavanaugh spoke of the importance of getting into the most difficult part of the antrum operation—getting into the anterior cavity. That is why Dr. Brophy opens it as he does. He can see every part of the cavity. If it is diseased anywhere, if fungi are present or exuberant granulations anywhere, he can take them out through this opening very easily.

Nothing had been said about the numerous cavities into which the antrum is sometimes divided, nor how to wash out these cavities. What better way is there of getting access to these cavities and breaking down the wall than by the methods described by the speaker? Many an antrum has been opened and treated, and then another cavity of the same antrum was filled with pus and not treated at all. What we want is to get out all the septa of bone, which will enable us to determine that we have freed the parts from infection.

Dr. Brophy then gave Dr. Maclay, the Secretary, a note from Dr. Homer M. Thomas, who was to have been present to discuss his paper, which read as follows:

"Dr. Homer Thomas is unable to be at the meeting tonight, but wishes you to know that he heartily indorses your views and the position you have taken, and with you believes the only way to properly open the antrum is through the dental arch. He would be glad to have you use his name as expressing this opinion."

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL
SOCIETY.

Regular Meeting, February 17, 1914.

DR. OTTO J. STEIN, PRESIDENT, IN THE CHAIR.

**Perversion of the Function of the Thyroid Gland in a Child Eleven
Years of Age.**

DR. GEORGE E. SHAMBAUGH: A little girl, eleven years of age, general physical condition well developed. Child apparently very alert mentally, but presenting as a most marked physical characteristic a perfectly flat nose, of which there appears to be no elevation of the bridge and no cartilage formed in the septum. There is no defect in nasal respiration. The child was referred because of suspected adenoids, for which she had already had an operation. In neither parent is there any suspicion of lues, and in neither family are there any hereditary defects. The child presents, also, in addition to the facial defect, a good many mental deficiencies, about which Dr. Shambaugh requested her teacher to make a statement.

Statement of the Teacher.—The child first came under the teacher's care about nine months ago. The teacher discovered that she had had some previous instruction and was able to read on three or four pages very quickly, because she had committed these pages to memory, although she did not recognize a dozen isolated words. The process of teaching the child was very slow, yet in the course of the few months' instruction the child now knows about three hundred words, learned by the word and sentence method. As far as reading and spelling are concerned, she learns as quickly as a slightly subnormal child, but in mathematics she is very deficient, and has not got beyond a realization of five. She writes fairly well for a child of five or six, although she is much older. Her mental development is perhaps five or six years behind. The teacher states that the child did not grow physically for

four or five years; did not walk until she was four, nor talk until she was five or six. She has a rampant imagination and relates exaggerated stories, apparently thinking them true. One cannot rely at all upon statements which she makes. She has been well trained at home about her person, but associated with her in the school was a boy who had not been so trained, and when the girl learned what a commotion his neglect produced she began the same thing, but very quickly was brought to check this habit by restraining her from going out.

DISCUSSION.

DR. J. HOLINER said that the child presented by Dr. Shambaugh shows a number of characteristic features: The low nose, the nasal bones being hardly raised above the plane of the face, causing the tip of the nose to be tilted upward. The glabella is deep, which makes the eyebrows hardly project over the eyes. This, together with other features, drew attention to the thyroid. The part above both sternal ends of the clavicles appears sunken; you cannot feel any lobes of the thyroid. Over the trachea you hardly feel a trace of an isthmus of the gland. There is a deficiency of thyroid gland tissue.

Furthermore, there are a number of other symptoms in the case that point to defect of the thyroid. Early ossification of the base of the skull causes the very narrow antero-posterior diameter at the base of the skull, and explains the deep position of the glabella. The sutures on the top of the head cannot be felt, though in a child of the age of this one you would expect to feel a distinct elevation. Furthermore, he referred to the peculiar dry and scaly condition of the skin. Another point that is often mentioned in this connection is the thickness of the lips. Around the mouth the myxedema is more pronounced, but it is noticed to some extent over the whole body. Another point is the condition of the little girl's hair. It is coarse, sparse, and very dry.

Dr. Holinger thought it certainly would be advisable to start in with systematic medication with thyroid gland and watch the result. These experiments, especially in children, have been made very extensively in Switzerland. The speaker

followed up the literature of those experiments very closely, and would be very much mistaken if some result did not follow in this case if systematic medication with desiccated thyroid gland were instituted.

DR. GEORGE W. BOOT thought the case is undoubtedly one that has some connection with perversion of the function of the thyroid gland. The tongue is large, and protrudes from the mouth a good deal of the time, which is a quite characteristic condition; also the dry, harsh skin. But the child lacks many of the other symptoms of cretinism. He has never seen a cretin so active as this child; they are usually dull and slow.

He has had under observation for a number of years an adult with the same characteristics of face that this little girl has, namely, a deficiency of the nose, and the same enlargement around the mouth and tongue. The woman has been a very bright woman, with nothing strange about her until some five or six years ago, when she had some disturbance in the circulation of the brain, apparently a thrombosis of some of the smaller vessels, and since then she has become a typical paranoiac.

Paper: Variations of Sphenoid Sinus Disease.*

BY GEORGE M. McBEAN, M. D.

DISCUSSION.

DR. L. W. DEAN said he had intended to bring a specimen that was of great interest to him—a postmortem specimen. The patient came into the department of internal medicine in the University Hospital a short time ago with a septic temperature, and the blood findings those of general sepsis. In addition to these findings, the only symptoms which the patient presented were a slight exophthalmos on the right side, and a marked papillitis of the right nerve head. The patient was sent down to Dr. Dean's department for examination, and an extensive pansinusitis was found, and a diagnosis made of cavernous sinus phlebitis, probably secondary to the sinusitis. In a few days the patient was so ill that it was impossible to con-

*See page 419.

tinued the examination of the case, and he died a few days noidal and cavernous sinus.

later. Postmortem examination showed a condition of pansinusitis. In the right sphenoid there was an abundance of polypi. There was a dehiscence of bone between the sphenoid and ethmoid sinuses.

Another thing occurred to him in connection with the discussion of sphenoidal sinusitis. Many patients come complaining of headaches at the base of the brain. If we talk to these patients we always find that they do not complain of headache at the base of the brain—it is either back of the eye, or occipital, or frontal, or on the top of the head, but they never localize it right at the base of the brain. It seemed to the speaker that if the patient had anything at all that would cause a headache at the base of the brain, it would be from trouble in the sphenoidal sinus. Nevertheless, experience has shown that these patients, when they have a headache the result of sphenoidal sinus infection, have a frontal headache, a pain back of the eye, or an occipital or temporal headache. The pain is characteristic in that it comes and goes, is a real pain, and is much worse in damp weather than in dry.

DR. GEORGE E. SHAMBAUGH recalled a few of these unusual sphenoid sinus cases. The more usual ones, where the infection of the sphenoid is found associated with multiple accessory sinus disease, either acute or chronic, are by no means uncommon. Of the unusual cases he recalled a woman of perhaps fifty, who was brought to him because of long-standing, severe, unbearable headaches, which she located in the occiput. She suffered from a dry pharyngitis, but no pronounced nasal symptoms. Both nasal passages were found practically normal, with the exception of the recessus sphenoidalis on the left side, where by inspection one could detect the formation of small crusts. Under cocaine the middle turbinate was removed and the anterior wall of the sphenoid sinus was broken away. A large amount of thick, almost dry, offensive secretion was removed. The patient made a good recovery and has had no trouble since, after a period of two or three years.

Another unusual case reminded him somewhat of the case of hemorrhage reported by the essayist. This was the case of a man, perhaps about thirty years of age, who had for sev-

eral years suffered from very severe headache, for which he had consulted a local physician in the country, who had found a slight deflection of the septum and had convinced himself that this was the probable source of the headache. The physician attempted to operate on the septum, but severe bleeding scared him away. Later, because of severe headache, the patient attempted to commit suicide. With a shotgun he blew off his chin. Later he had bone transplanted in the chin, and at that time had the septum of the nose straightened. Ever since the first attempt to operate on the nose the patient had at intervals suffered from very severe nasal hemorrhages. The man was brought to the hospital in a very much weakened condition, and the first glance gave one the impression of a man suffering from the cachexia associated with malignant disease. In examining the nose one could recognize in the region of the recessus sphenoethmoidalis a little pulsating mass, which the speaker diagnosed as a probable malignant growth. There were no eye symptoms. After a few days the patient died, following a hemorrhage. At postmortem an extensive disease was found, involving the sphenoid and posterior ethmoid region. The roof of the sphenoid had been eaten away and the hemorrhages had apparently come from the internal carotid. The condition was one of sarcoma.

Another unusual sphenoid sinus case occurred in a woman of about forty years, whose chief complaint was dryness in the pharynx. The patient presented a typical condition of atrophic rhinitis, with crust formation restricted to an area about the opening of the sphenoid. The shrinking of the middle turbinate was such that one could, without cocaine, look directly into the sphenoid sinus. A small amount of pus was coming from this sinus.

DR. C. M. ROBERTSON said it was hard to distinguish which variations belong especially to the sphenoid and which to the ethmoid sinus. He had observed four cases of a condition which he had not seen described, in which there was bilateral sphenoidal empyema, with bony atresia in the nostrils, which consisted of a solid isthmus of bone between the middle turbinate and the septum. In two cases there was just room over the atresia to pass a probe, and perhaps three or four milli-

meters of an opening along the floor of the nostril. In the other two the atresia was less in extent.

The first case was diagnosed as a tumor of the brain—the young woman was almost demented. She was in delirium, had hallucinations, and it was feared she would have to be placed in confinement. She had optic neuritis. No papillitis, but there was an optic atrophy in each eye, more pronounced in the right eye, vision being 22/200 in this eye, while in the other it was 20/120 or 20/160—he had forgotten exactly. There was a lack of taste and smell, and she had an angioneurosis in the throat which was very troublesome. One side of the throat would swell up to an enormous size, almost suffocating her, with a bronchial cough and terrific, bursting headache. Dr. Robertson cleaned out both sides of the nose, made her a new nostril, opened up both sphenoids and found purulent material present in both sphenoid cavities as well as postethmoidal cells. This case was rather remarkable, because the atrophy in each eye cleared up, so that the optic nerve became pink, the vessels became normal in size, and the vision came up to 20/20, with a cessation of all of the other symptoms.

The second case was that of a business man who commenced to have spells that were unfitting him for business. He had false epileptic spells. He would feel absolutely normal, and all of a sudden he would go away, and after a few moments waken up and find people looking at him. He had optic nerve irritation—not so marked as in the first case, but enough so that his acuity of vision was down to one-half normal. He had had these spells on an average of one in twenty-eight days for four or five years. He had a heterophoria, which was treated with prisms for eight or ten years. He had had muscle operations and muscle exercises with prisms, so that he was an educated eye subject. When the speaker examined him he found a bony atresia, almost similar to the preceding case. After operating upon the nostrils and correcting the atresia, the sphenoids were opened through the maxillary sinuses, which was the shortest route. Finding the maxillary sinus and the posterior ethmoid cells quite hard, he went into the sphenoid, where he found a large accumulation of yellowish, gluey material. From the antrum he went into

the sphenoid, and from the nose into the sphenoid, then removing the partition between the two routes. About the second or third time he presented himself postoperative he took away a piece of bone about as large as a thumb nail, and the next time the patient presented, Dr. Robertson saw a tumor mass extending down into the nose that looked the size of a normal middle turbinate, occupying about the position of a normal middle turbinate. The mass was movable, and so the speaker snared it off. It was sent to the laboratory and found to be a pituitary cyst. This man was relieved of his symptoms, and up to the present time has been absolutely well.

The third case was one which he was called in to see in consultation, a man who was unconscious, had a very high temperature, with delirium. His eyes were rolling around so that they could not be examined. However, there was a very peculiar odor noticed. On looking into his mouth, Dr. Robertson saw, against the posterior pharyngeal wall, the nasty, brownish, glairy mucus referred to, and on account of that made a diagnosis of sphenoidal abscess, probably with a brain abscess behind. He was taken to the hospital and operated on the next morning. As the sphenoid was entered a lot of this nasty, sticky fluid came out, and then the curette dropped into the cranial cavity for an inch and a half. All of a sudden there was a gush of blood and chunks of pus. The patient was turned over quickly on his abdomen. In a minute or two the blood stopped and packing was placed quickly. The temperature the next morning was down from 104.5° to 100° or 101° , and the patient was rational. Before this he was absolutely unconscious. The patient died in five or six days. He had a sphenoid abscess that had perforated posteriorly, and had an extradural abscess on the posterior surface of the sphenoid bone. Bony atresia was less extensive than in the former cases.

The fourth case was a similar one to that recited by Dr. McBean, in which the presenting tumor mass was a sarcoma. Those are especially the cases where the discharge is of that peculiar brownish material that is always found in sphenoidal abscesses, even if seen away down by the soft palate, usually associated with necrosis of the bone. They are the worst cases with which we come in contact. This discharge is of

the same character as that we get in necrosis of the ear, in those cases where we have nasty, fetid, thin, watery discharges following necrosis.

It seems to him that sphenoid abscess cases are very, very frequent, and it has always struck him that, as the pituitary body lies just above the sphenoid, all these cases of hyperpituitarism must necessarily at first be from an irritation by an inflammatory product in the sphenoid sinus itself. In many cases of hypo- and hyperpituitarism we can bring it right down to the sphenoid cells.

DR. McBEAN, in closing, said he was very much interested in what Dr. Robertson had said about the dark brown mucus that he finds. The speaker has never found it in his cases, and hopes he never will, if his cases are going to be as serious as those reported by Dr. Robertson. His own cases have been bad enough, but not like that.

He was also interested in what Dr. Robertson had said about the pituitary disease often being from the sphenoid. In one case he had reported—that of the girl with the unequal pupils—he was sure that her amenorrhea, which continued some months after that, was not due to anything else, but must have been due to the irritation in the sphenoid, and change of circulation in the hypophysis itself. He did not think, however, he could say that all the pituitary cases are due to that, though he is sure this one was.

Dr. Shambaugh's cases also were extremely interesting. He thinks that most of the dry pharynx cases are due either to disease of the posterior ethmoid or sphenoid.

Paper: The Actinomyces-Like Granules in Tonsils.

DR. DAVID J. DAVIS said that the actinomyces-like granules are commonly found in the crypts of the tonsils. They are in no way related to the true actinomyces. These granules always consist of bacilli, cocci and spirilla. The bacilli, which were successfully cultivated, belong to the fusiform bacillus group. They are strict anaerobes. They alone are not pathogenic for animals.

The entire granule, when injected into rabbits and rats, readily produces abscesses.

A symbiotic relationship probably exists between the cocci, spirilla and bacilli.

It is very doubtful whether these granules cause hyperplasia of the epithelium of the crypts. They occur at times in cyst-like spaces in the tonsil lined by compact squamous and hyalinized epithelium.

In the literature these granules have been confused with true actinomyces; misleading statements appear, especially in connection with the subject of actinomycosis of the tonsils.

The writer has not been able to find a well authenticated case of actinomycosis of the tonsils in the literature. It is not meant by this that they do not exist, but if they do they are probably very rare.

These granules are of interest from a practical standpoint, for the following reasons: They are responsible very largely for the odor of masses derived from the crypts, hence are concerned with the condition of foul breaths. They form a nucleus for the deposition of lime salts, thus being responsible often for the formation of tonsil stones. They often plug the crypts, thereby preventing proper drainage. There are always in these granules streptococci, which may be pathogenic and which may possibly play a rôle in chronic streptococcic tonsillitis.

DISCUSSION.

DR. GEORGE E. SHAMBAUGH considered Dr. Davis' work on the pathology of the tonsils very valuable and a contribution of great interest, especially to those working clinically with diseased tonsils. He has always been astonished in reading the reports of the finding of actinomyces in the tonsils that these cases presented no clinical symptoms by which this disease could be recognized. Dr. Davis' work clears up the situation by showing that these are not cases of actinomycosis at all. Dr. Shambaugh does not know as yet just what importance to attach to these cheesy plugs so frequently seen in tonsils. They are composed of different sorts of material, and often are present without apparently causing any symptoms. In other cases they do give rise frequently to distinct symptoms, such as a circumscribed congestion and soreness in the region of such a plug. There is usually a very offensive odor, of which the patient is often conscious. Very often

the patient recognizes the development of these plugs because of a general feeling of malaise and headache, which symptoms will clear up immediately after the tonsils have been cleansed. Apparently there is a certain systemic intoxication produced in some of these cases, possibly because the presence of these plugs favors the development of bacteria at the bottom of the crypts. Very often, too, these patients who have trouble with cheesy accumulations in the tonsils suffer from a great many attacks of acute tonsillitis, which are not only a nuisance, but often a serious menace.

DR. OTTO J. STEIN was attracted by this subject quite a few years ago, when the question of tuberculosis of the tonsil was so enthusiastically talked about, with invasion of the deeper structure of the neck. He was frequently astonished by the report in these removed tonsils of the finding of these actinomycetes-like granules or mycelial-like bodies in apparently not badly diseased tonsils. In fact, they were found in the tonsils removed from children quite frequently, and at first it was thought that some great discovery had been made, some early sign of the disease of actinomycosis. However, in speaking with Professor Zeit, who examined most of these cases for him at that time, he told the speaker that he placed no importance whatever upon them, and that they were very commonly found in the plugs of cheesy material that were found in the crypts of the tonsils. He expressed at that time, and also several times since, the belief that these granules are granule-like bodies that assume this ray-like formation, and meant scarcely anything in the average tonsil removed; that they were commonly found unassociated with any striking local condition around the tonsil or any marked infiltration around the jaw, cheek or neck, and that they might be entirely disregarded. There was another type, however, the true arrangement of the granules, that was associated with this disease, actinomycosis, but in almost all of those cases—in fact, every case—he had found the clinical findings of disease in the neck or tissues surrounding. The speaker had found a case that he believed to be a true case of actinomycosis of the neck, with the ray findings in the tonsil. The case was referred to him as one very like actinomycosis, and he was asked to remove the tonsils. The tonsils themselves did not show any-

thing particular—that is, they did not look very badly diseased, but just like a lot of the chronic tonsils that are removed, but this same arrangement was found. He would not express an opinion as to what relationship this particular finding has to the disease of the neck, but simply mentioned it because the case had recently come under his observation. He is now of the opinion that the arrangement of these granules in the ordinary tonsil, unassociated with any clinical manifestations of the disease itself—actinomycosis—means nothing at all, quite contrary to what Dr. Shambaugh had just expressed.

DR. C. M. ROBERTSON asked Dr. Davis if he, in his examinations, differentiated between the crypts of the tonsils in which these masses or granules were found, and also if there were any gland involvement in the cases in which they were found, or not.

DR. J. R. FLETCHER asked the members if they remembered when Dr. Grosvenor was here he made an investigation of quite a number of tonsils, and spoke of the relative frequency with which actinomycosis was found in those which he had sectioned. The speaker mentioned this because a year or two ago he removed the tonsils from a Sister of Mercy, who was sent to him supposed to have suffered from tuberculosis of the right lung. Dr. Zeit examined a section of the tonsil and he said it was not tuberculosis, but remarked that he had seen all of the Grosvenor preparations, and this one was the most beautiful case of actinomycosis that he had ever seen. He unqualifiedly pronounced it actinomycosis. This patient has gone on for quite a number of years, and seems to remain in about the same condition, so far as the tuberculosis of the lung is concerned. Dr. Zeit said that probably she had actinomycosis of the lung also. She had no glandular involvement of the neck that the speaker was able to find. He asked for some expression of opinion from the members.

DR. STEIN asked if Dr. Zeit called it a true case, to which Dr. Fletcher answered yes. He had removed the tonsils by request, as they were manifestly diseased, and the attending physician was fearful that the tonsils might have something to do with the disease in the lung, and that she might, perchance, have a better opportunity to recover if the tonsils were removed.

DR. OTTO J. STEIN said that Professor Zeit had no doubt found several "most beautiful" cases, because the speaker claimed the distinction of having the "most beautiful" case of actinomycosis, according to Professor Zeit.

DR. OTIS H. MACLAY said that it is well to consider the simple things in tonsil cases, which are sometimes overlooked, namely, the odor and the feeling of fullness in the tonsil. These patients often complain of a feeling as though there were a stick in the tonsil, and there is often a cough associated with the condition, where there is nothing much the matter with the patient—no pain or soreness. When the tonsils are cleaned out, the cough, with the other symptoms, disappears.

DR. GEORGE W. BOOT asked Dr. Davis regarding the bacilli growing in the form of a brush. Was this not an unusual form of growth for bacilli? Just what did Dr. Davis consider the relation between these organisms and the organisms of Vincent's angina?

DR. DAVIS, in closing, answering Dr. Robertson's question, said that in these cases where such granules are found in the tonsils, there is no glandular enlargement. It should be remembered that they are found in practically one-third of all adults. He imagined that if he were to examine the tonsillar crypts of every individual in the room he would find them in about thirty per cent. He has found them repeatedly in his own tonsils, and has commonly found them in the crypts of normal individuals. There is, therefore, little or no reason to suspect that there is any diseased condition when one finds them in tonsils.

With reference to the relation between the bacilli and the filaments, it should be stated that the central stalk is made up of the fusiform bacilli growing in long filaments, just as they often do in artificial culture. A bundle of threads may grow out, and at or near the ends, probably where the conditions of growth are somewhat different, the bacilli there grow somewhat shorter, and arrange themselves perpendicularly to this central stalk.

So far as their relation to the organism of Vincent's angina is concerned, he could not state that they are absolutely identical. However, he had no doubt but that they belong to that

group. There are some slight differences between certain strains of this group, so far as their appearance on culture media, reactions, and so forth, are concerned, just as there are differences between various strains of the streptococcus or typhoid groups. The fact that they are always associated with the spirilla is another point in favor of the idea that they belong to the fusiform group; for we know that the organism of Vincent's angina is nearly always associated with spirochetæ that exactly correspond with the spirochetæ found in these granules.

Dr. Davis is particularly interested in the question of the relation—or, rather, nonrelation—of these bodies to actinomycosis. He did not wish to criticize Professor Zeit, or anybody else, so far as this particular point is concerned. If anyone has any definite cases of actinomycosis of the tonsil, these cases should be reported, because there is not a single well authenticated report of such in the literature today. He did not deny that actinomyces might enter into the tissues through the crypts of the tonsils. He rather thought that they might, because the crypts would be a pretty good place for them to grow, and from there penetrate the tissues; but as a matter of fact there is no clear-cut evidence of that at the present time.

Furthermore, if anyone had such a case, he should not be content with simply examining sections of the tonsils. No absolutely reliable statement could be made from such examination. The organisms must be cultured, and the final proof will rest upon the result. Any evidence that is convincing must be of that character.

Paper: Fluoroscopic Bronchoscopy.

DR. E. FLETCHER INGALS AND DR. STANTON A. FRIEDBERG.
Three cases of foreign body removed from the bronchi were reported. The first case was that of a nail in a tertiary division of the left trunk bronchus. The second case was a band of gold that was a part of a crown for a tooth, which had lodged in the upper bronchus of the right lung. It had been present for several years; under local anesthesia it was removed with the aid of the fluoroscope. A third case,

that of a boy, aged nine years, with a brass bolt present in a cavity of the lower lobe of the left lung for about two and a half years, was also reported. This also was removed under local anesthesia.

A special forcep was used in these cases. It consists of a Krause handle with a simple tube forcep. Its main characteristic is that it is strong and of small diameter, and the grasping surface of the blades is cut like a file, with the cutting edge towards the handle.

Special importance is laid upon the necessity of being sure that the end of the forcep is in the same bronchus as the foreign body. When the forceps has been passed down so that its shadow reaches the shadow of the foreign body, the end of the instrument should be moved back and forth laterally, to determine whether or not it is in the same bronchus or cavity as the foreign body. If it is in a different tube, the shadow of the forceps will pass away from that of the foreign body, but if in the same bronchus, the shadow of the foreign body will move with that of the instrument.

DISCUSSION.

DR. OTTO J. STEIN said there was no doubt that the reports of Drs. Ingals and Friedberg showed a distinct advance in the technic of removal of foreign bodies in the esophagus or bronchi. He has had very little experience in this line of work, and could only report two failures. But he believes that the aid of the fluoroscope, if worked out, with proper team work, will eventually lead to the working up of a special technic that will facilitate removal of these foreign bodies. In one case in which he attempted to use the fluoroscope, a very small child of about eighteen or twenty months, a very fat child, the foreign body (a pool check, round with a square hole in the center) was never found or, rather, recovered. It could be seen distinctly with the fluoroscope. An attempt to remove it with the ordinary instruments failed entirely, owing probably to the inflammatory exudates that existed around the foreign body, on account of the manipulation that had been done the day before, continuing for some three hours. By the use of the fluoroscope the foreign body could be seen distinctly, but just at the moment when the speaker tried to

use the fluoroscope and instruments together, the child developed a violent convulsion. Temperature was 104.5°, and the convulsion was so violent that he had to desist. A little later the child died.

In another case he attempted to use the fluoroscope, but was again handicapped by very inefficient help. The nurse knew nothing about the work, and there was nobody else at hand. In this case he believed that if he had had the proper help he would have succeeded in getting the foreign body out; but as it was, he failed again.

DR. INGALS, in closing the discussion on his part, only wished to urge again that the forceps should be moved laterally, and that the operator be sure the foreign body goes with it. If it does not, one is liable to catch the lung tissue. If the foreign body goes with the instrument, it must be in the same tube, and then with care the chances are that the foreign body can be removed. If you have the right kind of a forcep, and get hold of the foreign body, never let go, unless you happen to get hold of the center of a screw, as was the case in one of the cases reported by Dr. Friedberg.

DR. FRIEDBERG, in closing the discussion, referred to the necessity of an earlier diagnosis in cases of foreign bodies in the lung. It hardly seems reasonable to wait two years to diagnose a metal substance in the lung. In Dr. Ingals' case the foreign body had been in for three years, and in his own case for over two years. The speaker had a somewhat similar case during the past summer, where a tooth had been aspirated and had been present for almost five months, and a small abscess cavity had formed. A picture of the chest revealed the shadow of a tooth. So, in all obscure lung conditions, where the history is indefinite, a fluoroscopic examination should be made. The earlier these cases are discovered, the less changes of a permanent character are found in the lungs, and the chances of a successful operation are increased.

DR. STEIN asked if it was possible to discover an aluminum foreign body by this method.

DR. INGALS said aluminum would show if it was very heavy, but light aluminum would not show.

DR. STEIN said the reason he asked was because recently

he had a case of an aluminum band, two and a half inches long, folded up, that did not show in many X-ray pictures. The fluoroscope was never used, and he was wondering if it would have shown this band.

DR. INGALS said he had had a case of an aluminum pin in the esophagus. He used the fluoroscope. At first he was satisfied that there was nothing there, but finally he saw the pin.

DR. FRIEDBERG had seen a case of an aluminum tracheotomy tube jammed down in the bronchus, which did not show.

